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The University of Minnesota Bulletin

College of Agriculture

1910-1911

Volume XIII June 1910 No. 8

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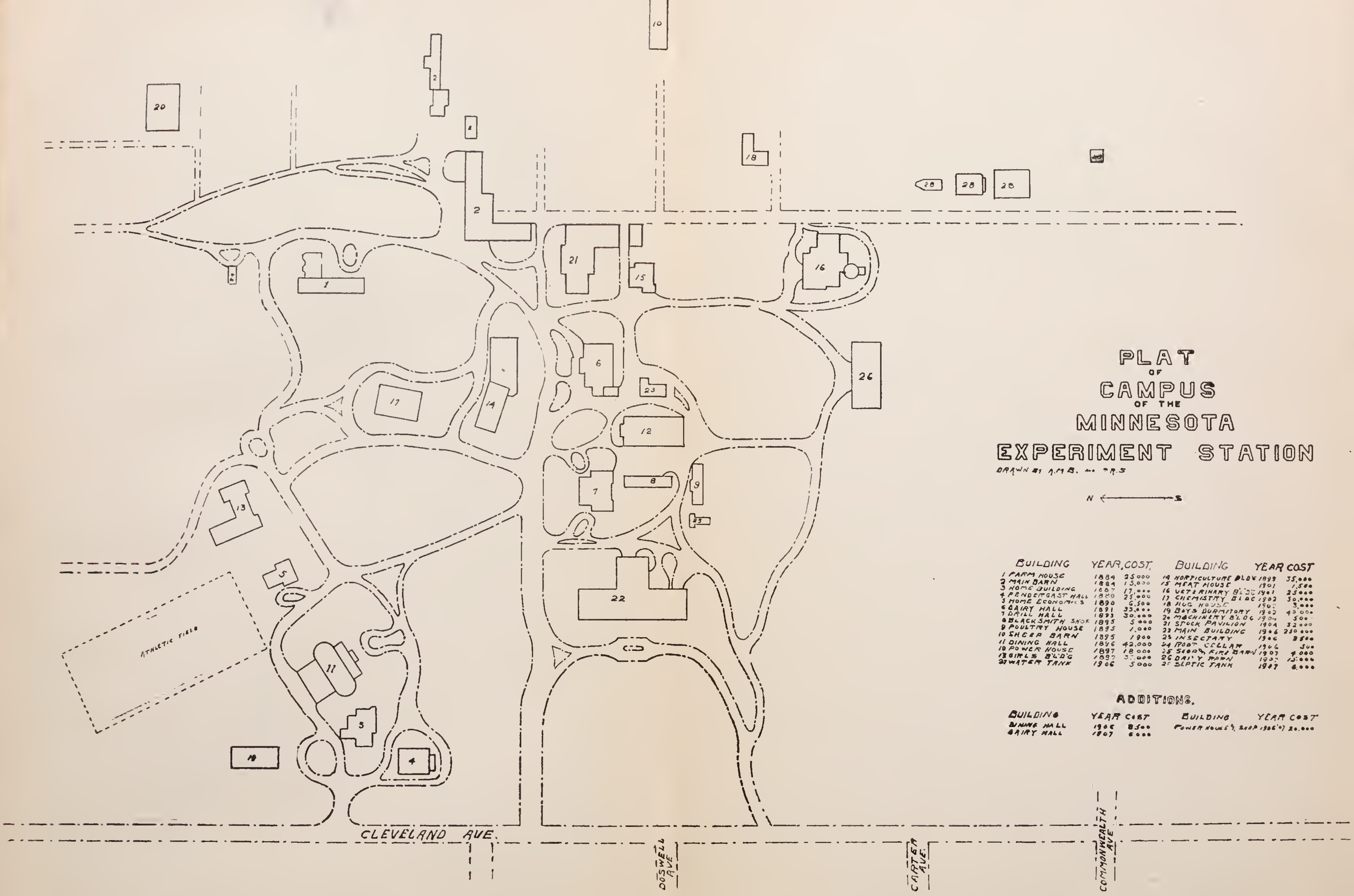
The University catalogues are published by authority of the Board of Regents, as a regular series of bulletins. One bulletin for each college is published every year and in addition a bulletin of general information outlining the entrance requirements of all colleges of the University, and embodying such items as University equipment, organizations and publications, expenses of students, loan and trust funds, scholarships, prizes, etc. Bulletins will be sent gratuitously, postage paid, to all persons who apply for them. In calling for bulletins, the college or school of the University concerning which information is desired should be stated. Address,

THE REGISTRAR,
The University of Minnesota,
Minneapolis, Minnesota.



PLAT OF CAMPUS OF THE MINNESOTA EXPERIMENT STATION

DRAWN BY A.M.B. AND T.R.S

BUILDING	YEAR.	COST.	BUILDING	YEAR	COST
1 FARM HOUSE	1884	25000	14 HORTICULTURE BLDG	1898	35,000
2 MAIN BARN	1884	13,000	15 MEAT HOUSE	1901	1,500
3 HOME BUILDING	1887	17,000	16 VETERINARY B'L'D'G	1901	25000
4 PENDERGAST HALL	1889	25,000	17 CHEMISTRY BLDG	1902	30,000
5 HOME ECONOMICS	1890	6,500	18 HOG HOUSE	1902	3,000
6 DAIRY HALL	1891	33,000	19 BOYS DORMITORY	1902	40 000
7 DRILL HALL	1893	30,000	20 MACHINERY B'L'DG	1904	500
8 BLACKSMITH SHOP	1895	5 000	21 STOCK PAVILION	1904	32 000
9 POULTRY HOUSE	1895	1,000	22 MAIN BUILDING	1906	250 000
10 SHEEP BARN	1895	1900	23 INSECTARY	1906	3500
11 DINING HALL	1896	42,000	24 ROOT CELLAR	1906	500
12 POWER HOUSE	1897	18 000	25 SHOP & FIRE BARN	1907	4,000
13 GIRLS B'L'D'G	1897	37,000	26 DAIRY BARN	1907	15,000
27 WATER TANK	1906	5 000	28 SEPTIC TANK	1907	6,000

ADDITIONS.

BUILDING	YEAR	COST	BUILDING	YEAR	COST
DINING HALL	1906	8500	POWER HOUSE & SHOP	1906'07	20,000
DAIRY HALL	1907	6000			

CALENDAR FOR 1910-1911

1910

JULY

S.	M.	T.	W.	T.	F.	S.
..	..	..	..	..	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	..	..	..	..	..	..

AUGUST

..	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	..	..	..
..	..	..	..	..	..	..

SEPTEMBER

..	..	..	..	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	..
..	..	..	..	..	..	..

OCTOBER

..	..	..	..	..	..	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	..	..	..	..	..

NOVEMBER

..	..	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	..	..	..
..	..	..	..	..	..	..

DECEMBER

..	..	..	..	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
..	..	..	..	..	..	..

1911

JANUARY

S.	M.	T.	W.	T.	F.	S.
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	..	..	..	..
..	..	..	..	..	..	..

FEBRUARY

..	..	..	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	..	..	..	..
..	..	..	..	..	..	..

MARCH

..	..	..	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	..
..	..	..	..	..	..	..

APRIL

..	..	..	..	..	..	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	..	..	..	..	..	..

MAY

..	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	..	..	..
..	..	..	..	..	..	..

JUNE

..	..	..	..	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	..
..	..	..	..	..	..	..

University Calendar

1910-1911

THE UNIVERSITY YEAR

The University year covers a period of thirty-eight weeks beginning on the second Tuesday in September. Commencement day is always the second Thursday in June.

1910			
August	30	Tuesday	Registration closes except for new students
Aug. 30–Sept. 6		Week	Fees payable, except for new students
September 6	12	Week	Entrance examinations, condition examinations, freshman registration and payment of fees
September	13	Tuesday	First semester begins
September	26	Monday	University Council meeting.
October	3	Monday	School of Agriculture session begins
October	6	Thursday	Board of Regents meeting
November	10	Thursday	Second quarter begins
November	24	Thursday	Thanksgiving Day, recess three days
November	28	Monday	University Council meeting
December	13	Tuesday	Board of Regents meeting
December	16	Friday	Holiday recess begins 5:40 P. M.
1911			
January	3	Tuesday	Holiday recess ends 8:30 A. M.
January	17	Tuesday	Registration for second semester closes
January	24	Tuesday	Payment of fees for second semester closes
January	31	Tuesday	Second semester begins
February	22	Wednesday	Washington's birthday, holiday
March	22	Wednesday	School of Agriculture session closes
April	6	Thursday	Fourth quarter begins
April	8	Saturday	Easter recess begins 5:40 P. M.
April	17	Monday	Easter recess ends 8:30 A. M.
April	24	Monday	University Council meeting
May	4	Thursday	Board of Regents meeting
May	30	Tuesday	Decoration Day, holiday
June	3	Saturday	Second semester closes
June	4	Sunday	Baccalaureate service
June	5	Monday	Senior class day exercises
June	6	Tuesday	Sigma Xi address
June	6	Tuesday	Senior promenade

June	7	Wednesday	Alumni Day
June	7	Wednesday	Board of Regents meeting
June	8	Thursday	Thirty-ninth Annual Commencement
June	9	Friday	Summer vacation begins

Program—Entrance Examinations

1910–11

Entrance examinations for admission to the various colleges of the University will be conducted according to the following schedule, in Room 205, Library Building.

Any student finding a conflict in his program should report to the Registrar for adjustment.

September	6	Tuesday	9 A. M.	Astronomy
				Botany
				Geology
				Chemistry
				Physiography
				Zoology
			2 P. M.	American Government
				History
				Economics
				Physics
				Commercial Geography
September	7	Wednesday	9 A. M.	English
			2 P. M.	German
				French
				Latin
				Scandinavian
September	8	Thursday	9 A. M.	Elementary Algebra
			2 P. M.	Higher Algebra
September	9	Friday	9 A. M.	Plane Geometry
			2 P. M.	Solid Geometry

The University Year for 1911-12 will begin Tuesday, September 12.

The University

THE UNIVERSITY OF MINNESOTA comprises the following named schools colleges and departments:

THE COLLEGE OF SCIENCE, LITERATURE AND THE ARTS
THE COLLEGE OF ENGINEERING AND THE MECHANIC ARTS
THE DEPARTMENT OF AGRICULTURE, including—
    THE COLLEGE OF AGRICULTURE
    THE SCHOOL OF AGRICULTURE
    THE DAIRY SCHOOL
    THE SHORT COURSE FOR FARMERS
    THE SHORT COURSE FOR TEACHERS
    THE SCHOOL OF TRACTION ENGINEERING
    THE FORESTRY SCHOOL
    THE CROOKSTON SCHOOL OF AGRICULTURE
THE COLLEGE OF LAW
THE COLLEGE OF MEDICINE AND SURGERY, including—
    THE TRAINING SCHOOL FOR NURSES
THE COLLEGE OF DENTISTRY
THE COLLEGE OF PHARMACY
THE SCHOOL OF MINES
THE SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY
THE COLLEGE OF EDUCATION
THE GRADUATE SCHOOL
The Regents of the University have entrusted to their charge:
  THE EXPERIMENT STATIONS, including—
    THE MAIN STATION AT ST. ANTHONY PARK
    THE SUB-STATION AT CROOKSTON
    THE SUB-STATION AT GRAND RAPIDS
THE GEOLOGICAL AND NATURAL HISTORY SURVEY

Bulletins of these schools, colleges and departments may be obtained upon application to the University Registrar.

The Board of Regents

CYRUS NORTHROP, LL.D., MINNEAPOLIS The President of the University	*Ex-Officio*
The HON. JOHN LIND, MINNEAPOLIS The President of the Board	1914
The HON. ADOLPH O. EBERHART, MANKATO The Governor of the State	*Ex-Officio*
The HON. C. G. SCHULZ, ST. PAUL The State Superintendent of Public Instruction	*Ex-Officio*
The HON. W. J. MAYO, ROCHESTER	1913
The HON. MILTON M. WILLIAMS, LITTLE FALLS	1913
The HON. HENRY B. HOVLAND, DULUTH	1914
The HON. A. E. RICE, WILLMAR	1915
The HON. CHARLES L. SOMMERS, ST. PAUL	1915
The HON. B. F. NELSON, MINNEAPOLIS	1916
The HON. PIERCE BUTLER, ST. PAUL	1916
The HON. CHARLES A. SMITH, MINNEAPOLIS	1916

C D. DECKER, MINNEAPOLIS,
Secretary of the Board.

Executive Officers

THE UNIVERSITY

CYRUS NORTHROP, LL.D., President

ERNEST B. PIERCE, B. A., Registrar

JAMES T. GEROULD, B. A., Librarian

C. D. DECKER, Purchasing Agent

J. D. BREN, Cashier

THE COLLEGES

JOHN F. DOWNEY, M.A., C.E., Dean of the College of Science, Literature and the Arts

FRANCIS C. SHENEHON, C.E., Dean of the College of Engineering and the Mechanic Arts

ALBERT F. WOODS, M.A., Dean and Director of the Department of Agriculture

WILLIAM S. PATTEE, LL.D., Dean of the College of Law

FRANK FAIRCHILD WESBROOK, M.A., M.D., C.M., Dean of the College of Medicine and Surgery

ALFRED OWRE, D.M.D., M.D., Dean of the College of Dentistry

FREDERICK J. WULLING, Phm.D., LL.M., Dean of the College of Pharmacy

WILLIAM R. APPLEBY, M.A., Dean of the School of Mines

GEORGE B. FRANKFORTER, M.A., Ph.D., Dean of the School of Chemistry

GEORGE F. JAMES, Ph.D., Dean of the College of Education

HENRY T. EDDY, C.E., Ph.D., LL.D., Dean of the Graduate School

ADA L. COMSTOCK, M.A., Dean of Women

The University Council

At the regular meeting of the Board of Regents of the University, May 31st, 1905, a University Council was established according to the following plan:

I. The name of the body shall be the University Council. It shall consist of the President of the University, the Deans of the various colleges and schools, one elected representative from each college or school for each 400 students or major fraction thereof, and one representative of the general alumni association.

II. The elected members shall serve for a period of one year. They shall be chosen from the various faculties at the time of the selection of standing committees. The representative of the general alumni association shall be chosen by that body at its annual meeting from among the alumni who are not members of the University.

III. The Council shall be authorized to—

a) Appoint the following committees or the faculty representation thereon:

The University auditing committee
The University press committee
The committee on athletics
The committee on University relations to other institutions of higher learning.
The committee on health and sanitation
The committee on commencement and other University functions
The committee on catalogue, programs and courses of study
The committee on student entertainments and social affairs
And such other committees as the general University interests may require.

b) Receive reports from such committees and to make such recommendations as may be required.

c) Consider and act upon any matter of general University interest beyond the province of a single faculty which may be referred to it by the President of the University or any faculty.

IV. The Council shall hold stated meetings upon the first Monday of October, December, April and June, and such other meetings as the President of the University may call.

Representatives to the Council

The University

President Cyrus Northrop

The College of Science, Literature and the Arts

Dean John F. Downey | Professor H. F. Nachtrieb
Professor J. C. Hutchinson | Professor Carl Schlenker
Professor Norman Wilde

The College of Engineering and the Mechanic Arts

Dean Francis C. Shenehon | Professor George D. Shepardson

The College and School of Agriculture

Dean Albert F. Woods | Professor John T. Stewart
Professor Edward M. Freeman

The College of Law

Dean William S. Pattee | Professor Henry J. Fletcher

The College of Medicine and Surgery

Dean F. F. Wesbrook | Professor Thomas G. Lee

The College of Dentistry

Dean Alfred Owre

The College of Pharmacy

Dean Frederick John Wulling

The School of Mines

Dean William R. Appleby

The School of Chemistry

Dean George B. Frankforter

The College of Education

Dean George F. James

The Graduate School

Dean Henry T. Eddy

The Dean of Women

Ada L. Comstock

The University Library

James T Gerould

General Alumni Association

David P. Jones

University Council Committees

The University Auditing Committee

PROFESSORS SIGERFOOS, FLETCHER, MITCHELL, SPRINGER WASHBURN

The Committee on Athletics

PROFESSORS PAIGE, HARDING, D. P. JONES, LITZENBERG, ROBINSON

The Committee on Grounds and Sanitation

PROFESSORS WESBROOK, APPLEBY, BASS, BRACKEN, FLATHER, FRANKFORTER, WOODS

The Press Committee

PROFESSORS SCHAPER, BEACH, CONSTANT, JOHNSTON, THOMAS

The Committee on Commencement and other University Functions

PROFESSORS NACHTRIEB, BUTTS, JAMES, KIRCHNER, PATTEE, SCHLENKER, DR. SCOTT, WILDE

The Committee on Student Entertainments and Social Affairs

PROFESSORS PIKE, BASS, BAUER, CLEMENTS, COMSTOCK, COOKE, OWRE

The Committee on University Relations to other Institutions of Higher Learning

PROFESSORS DOWNEY, BOTHNE, EDDY, GREEN, JAMES, LEE, SHENEHON

The Committe on University Extension and University Lectures

PROFESSORS JAMES, GRAY, HAECKER, A. E. HAYNES, JENKS, LEE, WULLING

The Committee on the Library

PROFESSORS EDDY, FLETCHER, GEROULD, LEE, REYNOLDS, SHENEHON, VAN BARNEVELD, WEST, JOHN ZELENY

The College of Agriculture

FACULTY

Cyrus Northrop, LL.D., President.
Albert F. Woods, M.A., Dean.
Samuel B. Green, B.S., Professor of Horticulture and Forestry.
T. L. Haecker, Professor of Dairy Husbandry and Animal Nutrition.
M. H. Reynolds, B.S., M.D., D.V.M., Professor of Veterinary Medicine and Surgery.
Andrew Boss, Professor of Agriculture and Animal Husbandry.
Frederick L. Washburn, M.A., Professor of Entomology.
E. M. Freeman, Ph.D., Professor of Vegetable Pathology and Botany.
John T. Stewart, C.E., Professor of Agricultural Engineering, Farm Structures and Farm Mechanics.
D. D. Mayne, Professor of Agricultural Pedagogics, Principal of the School of Agriculture.
Edmund L. Butts, Captain U. S. Army, Professor of Military Science.
Ralph Hoagland, B.A., Professor of Agricultural Chemistry and Soils.
Fannie C. Boutelle, Domestic Economics, Preceptress.

ASSISTANT PROFESSORS

C. P. Bull, B.Agr., Assistant Professor of Agriculture.
E. G. Cheyney, A.B., Assistant Professor of Forestry.
D. A. Gaumnitz, M.S.,Agr., Assistant Professor of Animal Husbandry.
R. C. Lansing, M.A., Assistant Professor of English.
C. C. Lipp, D.V.M., Assistant Professor of Veterinary Medicine and Surgery.
Edward K. Slater, Assistant Professor of Dairy Husbandry.
J. P. Wentling, Assistant Professor of Forestry.

INSTRUCTORS

A. C. Arny, B. S. in Agr., Agriculture.
Margaret J. Blair, Domestic Art.
A. M. Bull, Drawing.
Mary L. Bull, Domestic Science.

LeRoy Cady, B.S. in Agr. Horticulture.
Henrietta Clopath, Freehand Drawing.
T. P. Cooper, B.S. in Agr., Agriculture.
J. M. Drew, Registrar, Blacksmithing, Poultry.
J. L. Edmonds, B.S. in Agr., Animal Husbandry.
W. H. Frazier, B.S., Soils.
G. P. Grout, M.S., Dairy Husbandry.
Avis C. Hall, Domestic Art.
W. F. Handschin, Animal Husbandry.
A. D. Johnston, Blacksmithing.
Cornelia Kennedy, B.A., Agricultural Chemistry.
A. R. Kohler, B.S.A., Horticulture.
May McDonald, B.S., Domestic Science.
Karl A. Machetanz, B.A., Director of Gymnasium and Coach.
Mary L. Matthews, Domestic Art.
Martha B. Moorhead, M.D., Lecturer in Domestic Science.
J. L. Mowry, Farm Mechanics.
W. L. Oswald, Agricultural Botany.
C. A. Pyle, B.S., D.V.M., Veterinary Science.
H. B. Roe, B.S., Mathematics,
A. G. Ruggles, M.A., Entomology.
Juniata L. Shepperd, M.A., Domestic Science.
Anna M. Smith, Librarian.
E. W. Stafford, B.S.A., Entomology.
E. C. Stakman, B.A., Plant Pathology.
Dillon P. Tierney, M.F., Forestry.
J. A. Vye, Farm Accounts.
Rodney M. West, B.A., Agricultural Chemistry.
H. B. White, B.S. in Agr., Carpentry.
Grace B. Whitridge, Physical Training.

FACULTY COMMITTEES

1910–1911

1. Enrollment and Program
   Stewart, Chairman, C. P. Bull, Mowry, Lansing, Cady.
2. Curriculum and Catalogue.
   Green, Chairman, Boss, Haecker, Mayne, Stewart, Washbuan.
3. Student's Work.
   Freeman, Gaumnitz, Roe, West, Shepperd.
4. Military.
   Butts, Chairman, Wentling, Hoagland.
5. Library.
   Mayne, Chairman, Reynolds Green, Smith, Hoagland.

6. DEBATE AND ENTERTAINMENT.
    Washburn, Chairman, Boutelle, Pyle, Grout, Drew.
7. GRADUATE.
    Haecker, Chairman, Ruggles, Lipp, Freeman, Stewart, Blair.
8. ATHLETICS.
    Cheyney, Chairman, Machetanz, Cooper, Handschin.
9. DEMONSTRATION AND EXHIBIT.
    Boss, Chairman, Mayne, Ruggles, Frazier, Blair.
10. SANITATION.
    Reynolds, Chairman, Mayne, Boutelle. Washburn, Stewart,
11. GROUNDS.
    Green, Chairman, Mayne, Boss, Freeman, Stewart.

General Information

REQUIREMENTS FOR ADMISSION TO ALL COURSES IN THE COLLEGE OF AGRICULTURE

Applicants for admission to the freshman class in the College of Agriculture must offer fifteen entrance credits of high school or other sceondary school work, so chosen as to include those prescribed below. An entrance credit is granted on the basis of a recitation period of at least forty minutes, five times per week, for not less than thirty-six weeks. In the case of drawing, shop work and laboratory practice, double recitation periods must be devoted to the work, or only half credit will be granted. This credit can be secured by

(a) Examination.
(b) A certificate from a fully accredited high school.
(c) Transfer from some other university or college.

In all cases fifteen entrance credits of high school work are required. Of these the following are prescribed, and no substitutes are accepted:

List A:

ENGLISH	4 credits
ELEMENTARY ALGEBRA	1 credit
PLANE GEOMETRY	1 credit
*PHYSICS	1 credit
Required for Forestry and General Agriculture, but optional in Home Economics and Teachers' Courses	
*SOLID GEOMETRY	½ credit
*HIGHER ALGEBRA	½ credit

The remainder of the fifteen units must be made up from the subjects in List B. No subject is accepted for an amount less than the minimum mentioned in the list.

List B:

LATIN	
Grammar	1 credit
Caesar, two or four books	½ or 1 credit
Cicero, three or six orations	½ or 1 credit
Virgil, three or six books	½ or 1 credit

*Optional for the year 1910–1911; after that required.

Boys must have Higher Algebra before taking Trigonometry in 1910–1911.

Greek	
Grammar	1 credit
Literature	½ or 1 credit
French	
Grammar	1 credit
Literature	½ or 1 credit
Spanish	
Grammar	1 credit
Literature	½ or 1 credit
German	
Grammar	1 credit
Literature	½ or 1 credit
History	
Ancient, to Charlemagne	½ or 1 credit
Modern, from Charlemagne	½ or 1 credit
English	½ credit
Senior American	½ credit
American Government	½ credit
Elementary Economics	½ credit
Commercial Geography	½ or 1 credit
Physics	1 credit
Botany	½ or 1 credit
Zoology	½ or 1 credit
Astronomy	½ credit
Geology	½ credit
Physiography	½ credit
Physiology	½ credit
Drawing	½ or 1 credit
Shop Work	½ or 1 credit
Domestic Art and Domestic Science	½ or 1 credit

Credit in other agricultural, business or manual training subjects is only given when the applicant is a graduate of an accredited school having taken such subjects in the regular course.

GENERAL RULES GOVERNING ALL ADMISSIONS TO THE COLLEGE OF AGRICULTURE

ENGLISH EXAMINATION

All applicants for admission to the undergraduate courses in the College of Agriculture are required to take an examination in punctuation, spelling and grammar. This rule applies to all applicants, whether with or without certificates from accredited schools and to those who seek entrance to advanced standing on credits from other colleges or normal schools. Those who fail in the examination are required to remove the condition by studying material provided by the English Department.

The examination will be given in the Short Course Room, Main Building, College of Agriculture, Monday, September 12th, at 9 A. M.

Any who have passed in the entrance examination in English given by the College of Science, Literature and the Arts, will be excused from this test on the presentation of the certificate of examination to the registrar.

ADMISSION TO THE FRESMHAN CLASS BY CERTIFICATE

The following are admitted to the freshman class by certificate:

(A) Graduates of a four-year course of a Minnesota state high school or other accredited school in Minnesota, provided:

1. That they have the required credits in List A.
2. That they have the additional credits for subjects selected from List B.
3. That they have records of "passed with credit" or "passed with honor" in all subjects presented.

In per cent these grades are to be interpreted approximately as follows:

(1) In schools having 65 as a passing mark, passed = 65–75, passed with credit = 75–90, passed with honor = 90–100.

(2) In schools having 75 as a passing mark, passed = 75–80, passed with credit = 80–90, passed with honor = 90–100.

The applicant for admission must present to the Registrar the principal's certificate containing his record on all the studies which were counted towards graduation.

Each mark below "passed with credit" shall count as a condition unless a state high school board certificate shall be presented for the same subject.

This rule for admission shall be applied to all work completed after June, 1908. Until it goes into effect for the full four years' work, applicants will be admitted, provided they have not, on the average, more than one semester mark below "passed with credit" for each year subject to the rule.

(B) Graduates of the School of Agriculture, who have completed the subjects prescribed in the intermediate course or fourth year, provided that for all work completed after April, 1909, they have no subject below 75. Subjects below 75 will be treated as a condition, the same as in the high schools.

(C) Graduates of the advanced Latin course of the Minnesota state normal schools.

(D) Graduates from schools in any other state, accredited to the state university of that state, will be admitted on the same terms as graduates of Minnesota state high schools; but their grades must be made on the blank form of the University of Minnesota and the certificate filled in and signed, certifying that the school is properly accredited at the university of the state in which it is issued.

Students bringing records from accredited schools are required to present them on the blank form provided for the purpose by the University. Blank forms may be obtained from the registrar. No other form of certificate will be accepted. Students who do not bring their certificates on the proper form of blank will not be allowed to register until they have secured the certificate on the required form.

ADMISSION TO THE FRESHMAN CLASS BY EXAMINATION

Applicants who are not graduates or from schools not coming within any of the above classes must take the regular entrance examinations.

Students who enter by examination, besides the entrance examination in English, must pass examinations in secondary school subjects as follows:

(1) The required credits under list A, and

(2) The additional credits selected from the electives under list B, provided that, if the total of entrance conditions does not exceed one and one-half credits, the applicant shall be admitted conditionally and be given one year in which to make up the entrance conditions.

The character of the preparation needed to pass the examinations is indicated in the descriptions of subjects below.

Entrance examinations are offered at the University during the opening week of the University year, and all intending to enter by examination should be present that week. The program for the year 1910–11 is printed in this bulletin on page 1. Certificates of Minnesota state high school board examinations will be accepted in place of University entrance examinations in whole or in part.

TRANSFER FROM OTHER UNIVERSITY OR COLLEGE

Applicants transferring from other universities or colleges must furnish a certificate showing they have no entance conditions and are honorably dismissed.

DESCRIPTION OF SUBJECTS ACCEPTED FOR ADMISSION

The following statements indicate in a general way the preparation which the University expects in the various subjects accepted for admission.

English (four years)

In order to secure a definite plan of study and unity of method on the part of preparatory schools, the entrance requirements in English is outlined below somewhat in detail. To satisfy this requirement a four-year course of not less than four hours per week must be pursued. The headings under which instruction will naturally fall are:

(a) English Classics
(b) The Principles of Rhetoric
(c) Practice in Written Expression in each of the Four Years of the High School Course on an average of not less than One Hour a Week.

(a) English Classics should include a critical reading, in class, of English masterpieces. The following are suggested as well adapted for such study: Shakespeare's Macbeth; Milton's Paradise Lost; Carlyle's Essay on Burns. In the study of these works the student should know the leading facts connected with the author and his time, he should become familiar with the subject matter of the work and thoroughly at home with the story, and should have a clear idea of the form and structure of the work as a whole.

A less critical knowledge of other standard or classic works, which may perhaps be read by the student at home, with written reports and brief oral discussions in class, is desirable. The following works are noted as indicative of the minimum amount of work expected; at least two of Shakespeare's plays, beside the one read in class, one of Irving's works, one of Hawthorne's novels, one of Stevenson's novels, one of Webster's orations.

(b) The work in the principles of composition should include the principles and technical terms of ordinary texts upon the subject, whether acquired by the direct study of such texts or mainly by the study of selected English masterpieces. It should not be forgotten that this is not an end in itself, but simply a means of teaching the student the correct use of English.

(c) An average of not less than one hour each week in each of the four years of the high school course should be devoted to practice in written expression, subject to the criticism either oral or written, of the teacher. The instructor may choose such topics as local conditions may require or make most profitable, but whatever line of work is pursued, the student should be taught to use language correctly and forcibly and learn to express himself clearly and logically in writing.

Elementary Algebra (one year)

The four fundamental operations for rational algebraic expressions; factoring; highest common factor; lowest common multiple; fractions, including complex fractions; linear equations, both numerical and literal, containing one or more unknown quantities; problems involving linear equations; binomial theorem for positive integral exponents; powers and roots of rational algebraic expressions and of numbers.

Higher Algebra (one-half year)

This course should begin with a thorough review of the work of the previous course, to the end that principles should be learned and theorems and rules rigorously demonstrated. Numerous problems which involve putting questions into equations should be solved, attention being paid to gaining an understanding of the principles involved rather than to mere dexterity in solution.

The additional topics to be treated are:—theory of exponents; surds; quadratic equations, both numerical and literal; equations with one of more unknown quantities that can be solved by the methods of quadratic equations; progessions; graphs.

Plane Geometry (one year)

The usual theorems and constructions contained in the best text books, including the general properties of plane rectilinear figures; the circle and measurement of angles; similar polygons; areas; regular polygons and the measurements of the circle.

Special emphasis should be placed upon developing the ability to solve original exercises, loci problems, and problems involving the mensuration of lines and surfaces.

Solid Geometry (one-half year)

The usual theorems and constructions contained in the best text books including the relation of planes and lines in space; the properties and measurement of prisms, pyramids, cylinders and cones; the sphere and spherical triangle.

Original exercises, loci problems and problems involving the mensuration of surfaces and solids should form an important part of the course.

Latin Grammar (one year). This will include the subjects of orthography: etymology and syntax. Proficiency is particularly desired in the following subjects the analysis of the verb forms, the rules of syntax, qnd the principal parts of the irregular verbs.

Caesar (one year). The student should complete the first four books or selections from the seven books equivalent to four; or three books, with thirty pages of Cornelius Nepos, or two books with sixty pates of Cornelius Nepos. Special attention should be paid to the translation of passages of the text into correct and idiomatic English; grammatical questions connected with the text, more especially on the subjunctive mood, indirect discourse and the sequence of tenses. The student is expected to be familiar with the life of Caesar and an account of his wars.

Cicero (one year). Any six orations from the following list should be studied Against Catiline, Poet Archias, Ligarius, Marcellus, Manilian Law (to count as two orations), the fourteenth Philippic. The student should also be familiar with the life of Cicero.

Virgil (one year). This study should include six books of the Aeneid, or five of the Aeneid and one of the Metamorphosis of Ovid, or the Eclogues. The student should be familiar with the life of Virgil and an account of his times and writings. A correct rythmical reading of the text is to be encouraged.

Greek Grammar (one year)

Xenophon's Anabasis (one year)—Four books

German (two years)

First year the pupil should acquire:

(1) A correct pronunciation, training of the ear, eye and organs of speech.

(2) A vocabulary of a thousand words of every day use; facility in combining these words into simple sentences. As a means to this, 100 to 150 pages of easy narrative prose and poetry should be read from which questions and answers may be formed. To test the student's memory and knowledge of the word-order he should relate or write out the story anew in his own words.

(3) From two to three hundred German idioms.

(4) The essentials of German grammar, to be taught by means of oral and written exercises based upon the reading lessons.

Second year the pupil should:

(1) Read one hundred and fifty to two hundred pages of prose and poetry

(2) Practice in reading smoothly and with expression.

(3) Carefully translate selected passages of the text into idiomatic English. To translate easy sentences which the student already understands is a waste of time.

(4) Translate sentences from English into German, using words and idioms of the text read.

(5) Study topically German grammar, chief rules of orthography, etymology and syntax; illustrate these by words, phrases and sentences selected or composed by the student.

French (two years). This work comprises the principles of French grammar, including acquaintance with the verb, regular and irregular, and ability to translate easy English sentences into French and simple French prose into English.

Spanish (two years). The first year's work includes grammar and reader; second year, grammar reviewed, reading of some modern writer, composition and conversation.

Scandinavian Languages, Norwegian, Swedish or Icelandic (two years). The student should acquire the principles of grammar, ability to read and translate ordinary prose and easy poetry, also to translate from English, and a fair acquaintance with the history of Scandinavian countries.

Ancient History (one year).

(a) This study should begin with from five to seven weeks upon the oriental peoples who have most influenced European development, noting the early civilizations in the valleys of the Nile and Euphrates, the spreading and meeting of these civilizations in the intermediate region, with notice of the more important states in that district, and the union of the East under Persia. This survey should aim to give an idea of the reach of recorded history, of the distinguishing features of the successive oriental nations, and of their more important influence upon later European development.

(b) In the Greek and Roman age emphasis should be put upon the evolution of institutions, and considerable attention should be paid to the later Hellenistic period, after the rise of Macedon, and to the Roman Empire, with its bearing upon subsequent history. Some of the work should be illustrated by the use of sources, and maps should be used constantly.

(c) The subjects should be carried down to the establishment of Charlemagne's empire. This will bring together all the chief lines of influence which were afterward to make our modern world, will show the meaning of the preceding eras as can not be done if the study stops at an early date, and will leave the subject at a period of comparative order and simplicity.

Modern History (one year). From Charlemagne to the present. The topics to which special attention are called are the period of disorder after Charlemagne and the consequent rise of feudalism, the Holy Roman Empire and the papacy, the medieval church, the crusades, the free cities, the rise of national monarchies, the intellectual renaissance and the protestant reformation, the French revolution and the subsequent democratic movements in politics and industry.

It is desirable to give at least half of the year to this last period from 1789.

English History (one-half year). The Saxon period should be passed over rapidly. In the remainder of the work, besides the narrative, constitutional points should receive attention, and easily accessible documents, like Magna Charta, should receive careful study.

Senior American History (one-half year). No attempt should be made to cover the whole field in this time. Either the colonial history or the period from 1783 to 1832 offers quite enough material. In any case, considerable use should be made of collections of documents, and sources.

American Government (one-half year). This should be a study of our government, national, state and local as it is organized and actually operated today Students should be made familiar with the purpose and salient features of important instruments of government and other public acts like the Declaration of Independence, Articles of Confederation, the Constitution of the United States, the Constitution of Minnesota, and a local city or village charter.

In no case, however, should the instruction consist wholly or largely of an analysis of documents. It should rather aim to impart information essential to intelligent, active citizenship, such as the division of the government into departments, their organization and function; the methods of nominating, electing, and appointing men to office; of framing and amending constitutions, city charters and statutes; of drawing grand and petit juries and the duty of the citizen to serve on them; the distinction between common law, state law, and constitutional law, between equity, civil and criminal cases.

To make the government seem a real working organization to the student, he should be encouraged to observe public proceedings by attending school meetings, town meetings, sessions of the county commissioners, city council, state legislature. a trial in court, and party primaries and conventions. He should also be led to read about and observe public affairs for himself. To that end let him collect statistics and accounts of work done by particular offices and departments from published reports and by personal inquiry.

PHYSICS (one year). The course should aim throughout to encourage accurate thought on the part of the student. For this reason the time should be spent mainly on the explanation and systematization of physical facts of common experience with which the student is already more or less familiar, rather than in the acquisition of new facts. The fundamental numerical relations should be emphasized by varied simple problems. Most of the qualitative experiments should be done by the instructor. All of the experiments performed by the student should be done with the greatest possible care and accuracy, and a neat record should be kept of all such work. With the text-books now commonly used the student will receive more beneficial training if the subject-matter studied is confined to the mechanics of solids and fluids, heat and ether, sound and light, or electricity and magnetism.

CHEMISTRY (one year). The full year's work should include a study of both the non-metals and metals with labotatory experiments illustrating the common chemical laws and the commoner chemical reactions.

BOTANY (one or one-half year). The course in botany should extend through the school year whenever it is possible, even if as much time cannot be given to it each week as when it occupies a single semester. The course should follow as closely as possible the nature and work of plants during the changing seasons of the year. The major portion of the work should be with living plants, or with plant structures outdoors and within. The microscope should be used only for a brief study of the general structure of root, stem, leaf and flower, and for a short survey of flowerless plants. The work should be scientific in method, but practical in outlook. It may well include a large amount of the science and practice of agriculture in so far as these are practicable in an elementary study of plants. The naming of the common plants of the neighborhood, both cultivated and native, the study of plant parts from the seed to maturity, simple experiments with plant functions, and the uses of plants in everyday life should constitute the larger part of the course. Since conditions vary in nearly every school, the best results will be obtained if teachers will refer their problems directly to the department of botany of the University.

ZOOLOGY (one or one-half year). The course of zoology, whether a half year or a year course, should be a natural history rather than a modern morphological course. Collecting and classifying (as a means) should be encouraged as much as possible. Animals should be studied as living units, in their relation to one another and their environment. The general and special structural feature in relation to the habits, the food and manner of obtaining it, the enemies and means of protection against them, hibernation, migration, the differences in habits, form and structure between the old or mature animal and the young, the relation of parents to their offspring, etc. —in short, all about the life of the animal under consideration should be made out by direct observation of the animal in its natural home and in confinement.

The course, on the whole, should aim to foster and develop a love for nature, train the power of observation toward accuracy, and give a healthful stimulation to the imagination. The pupil should be guarded against the habit of confounding the facts of observation with his interpretation and his judgments.

The animals for direct observation should be selected from as many branches of the animal kingdom as possible, and the changes during the year in the character of the fauna of the locality in general as well as of some particular region should be noted In some localities the work will of necessity be largely restricted to land and air animals, but no locality in Minnesota is so poor in animal life that very profitable work cannot be laid out along the line indicated above

It will be noticed that such a course of necessity includes so-called laboratory work. The amount and extent of the laboratory work will depend upon conditions, but even under the best conditions it is hardly advisable to go into detailed dissection and embryology. Continued, repeated, and close observation, aided now and then, by a simple hand lens or a compound microscope, will reveal an abundance of material and opportunity for disciplining the mind.

ASTRONOMY (one-half year). An elementary course in general astronomy as presented in any good modern text-book will satisfy this requirement.

GEOLOGY (one-half year). These subdivisions should receive special attention; physiographic geology, which treats of the building of the land and the evolution of its existing contours; geo-dynamics, the study of the forces, atmosphere, water, terrestrial heat, plants and animals, modifying the earth; and a brief survey of historical geology.

PHYSIOGRAPHY (one-half year). The following topics should be emphasized; meteorology, the leading facts relating to the atmosphere and its phenomena, including some acquaintance with the work of the United States weather bureau; land sculpture, as it treats of the origin, development and decadence of land forms, and the influence of these processes on the physical environment of man.

BUSINESS SUBJECTS

THESE ARE ACCEPTED FOR ADMISSION ONLY WHEN CONSTITUTING PARTS OF A BUSINESS COURSE

The following syllabi are offered by the University in order that the schools may be informed concerning the preparation expected in business subjects, in view of the fact that the graduates of business courses are now admitted to certain colleges of the University on the same footing as the graduates of other courses.

It is not intended nor expected that many schools, nor perhaps any one school, will offer all the subjects indicated. Not to exceed forty per cent of the units for admission should in any case be taken from the list of technical business subjects named below. The other sixty per cent should embrace the required English and mathematics, together with some work in history, science and the modern languages. The University is strongly of the opinion that no business course should be offered which does not include at least two years of some one modern language.

Under the head of business subjects are included two distinct lines of work: first, courses dealing with the history, description, theory and law of business, including the history of commerce, commercial geography, elementary economics and business law: second, courses dealing with the technique of business. The latter may be further subdivided into the mathematics of business, including business arithmetic, bookkeeping and business practice and the language of business, including stenography, typewriting and business correspondence.

ECONOMIC HISTORY OF THE UNITED STATES (one-half year). A study of

American history with special attention to the economic factor. It should be based on some text book such as Wright, Coman or Nogart and supplemented by collateral reading, especially in books such as Semple and Brigham on geographic influences.

This course will naturally follow the one on English history and may take the place of the usual political American history.

Economic History of England (one-half year). A study of English history with special reference to causes and effects of her economic development. It should be based on some of the smaller economic histories such as Cheyney, Price or Cunningham and McArthur.

This course, where given, will naturally follow the courses in general European history, and may take the place of the usual political English history.

Business Law (one-half year). The object of this study is not to make "every man his own lawyer" but rather to enable him to keep out of legal complications. Text book supplemented by study of a few typical cases, and practice in drawing up ordinary legal papers such as bills, notes, checks, etc.

Business Arithmetic (one-half year). The object is first of all, absolute accuracy and secondly speed in ordinary business computations. The topics to be emphasized are fundamental operations, common fractions having as denominator 2, 3, 4, 6 and 8, a few common weights and measures, percentage and its applications, and useful short methods,especially the use of interest and other calculation tables. The work should be based on a text book, supplemented by numerous live exercises from current sources.

Elementary Bookkeeping (one year). A text book should be employed with exercises so arranged that no two pupils will do exactly the same work, and no credit should be allowed unless the work is done neatly, accurately and at a satisfactory rate of speed. It is suggested that double periods be provided, and all work be done in class under the eye of the instructor. The set used should include the journal, cash book, sales book, ledger, check book, bank pass book and trial balance book.

Advanced Bookkeeping and Business Practice (one year). Thorough drill on standard business forms, such as bills, receipts, checks, notes, etc., also on the use and meaning of business symbols and abbreviations. The student should become acquainted with the bill book and invoice book,and loose leaf and voucher systems of bookkeeping. Each student should carry on a business of his own, first as an individual, then as a partnership, and finally as a corporation. Credit on this course should mean that the student lacks only age and actual business experience to become a competent bookkeeper.

Stenography and Typewriting (two years). This work is expected to occupy not less than two periods daily for two years. No credit should be given for either shorthand or typewriting if taken alone. Nothing but the touch method should be used in typewriting. The essentials are first, accuracy and speed in taking dictation and transcribing notes; secondly, correct spelling, capitalization, punctuation and paragraphing. The minimum speed at the end of the first year should be 75 words per minute in dictation and 25 words per minute on the machine; and at the end of the second year, 100 words per minute in dictation and 35 words per minute in transcribing notes. Thorough training should also be given in care of the machine, in modern methods of manifolding and in filing papers.

Spelling and Business Correspondence (one-half year). Preliminary review of five hundred common technical business words. Thorough training on business correspondence including(1)the proper form for business letters, (2) the proper choice of words and construction of sentences with reference to clearness and brevity, (3) capitalization, punctuation and paragraphing, (4) writing and answering telegrams and advertisements . The work should be based on a text book supplemented by letters relating to the most prominent industries of the locality.

MANUAL SUBJECTS

THESE ARE ACCEPTED FOR ADMISSION ONLY WHEN CONSTITUTING PARTS OF A MANUAL TRAINING COURSE

In view of the multiplication of manual training courses in the high schools, it seems well to define what the University expects in the line of manual training and drawing work. It is not implied that many schools, or perhaps any one school should offer all of the subjects indicated. Not to exceed twenty-five per cent of the units for admission to the University should in any case be taken from the list given below. The major part of the course should consist of the required English and of mathematics, history, business subjects, science and foreign languages. Students taking a manual training course should be held to a full course in mathematics, and should be required to complete not less than two years of one foreign language.

Owing to the fact that drawing and shop work do not require outside preparation they should not be credited by the schools on the same basis as the academic subjects. Therefore half credits are allowed; that is, one full credit for two years of work one period daily, or for one year of work two periods daily, in each subject:

Freehand Drawing (two credits)
Mechanical Drawing (two credits)
Joinery (one-half credit)
Wood Turning and Cabinet Making (one-half credit)
Pattern Making and Forge Shop (one-half credit)
Machine Shop, including Chipping
Filing and Work on the Iron Lathe (one-half credit)
Drill Press and Iron Planer
Clay Modelling (one-half credit)
Wood Carving (one-half credit)
Domestic Art, including Carefully Graded Exercises in Sewing (one credit)
Domestic Science, including Practical Cookery, and Household Economy (one credit)

AGRICULTURAL HIGH SCHOOLS

Arrangements will be made to properly accredit Agricultural subjects taken by graduates in high schools working under the Putnam Act.

LIST OF ACCREDITED SCHOOLS

Graduates of the following Minnesota State High Schools will be admitted to the University of Minnesota without conditions, provided that their credentials satisfy the specific requirements of the college to which entrance is desired.

Ada
Adrian
Aitkin
Akeley
Albert Lea
Alden
Alexandria
Amboy
Annandale
Anoka
Appleton
Argyle
Arlington
Atwater
Austin
Bagley
Barnesville
Belle Plaine
Bemidji
Benson

- Bird Island
- Biwabik
- Blooming Prairie
- Blue Earth
- Brainerd
- Breckenridge
- Browns Valley
- Buffalo
- Caledonia
- Cambridge
- Canby
- Cannon Falls
- Cass Lake
- Chaska
- Chatfield
- Chisholm
- Clarkfield
- Cloquet
- Cokato
- Coleraine
- Cottonwood
- Crookston
- Dawson
- Delano
- Detroit
- Dodge Center
- Duluth
  - Central
  - Industrial
- Eagle Bend
- E. Grand Forks
- Elbow Lake
- Elk River
- Elmore
- Ely
- Eveleth
- Excelsior
- Fairfax
- Fairmont
- Faribault
- Farmington
- Fergus Falls
- Fertile
- Fosston
- Frazee
- Fulda
- Gaylord
- Glencoe
- Glenwood
- Graceville
- Grand Meadow
- Grand Rapids
- Granite Falls
- Hallock
- Halstad
- Harmony
- Hastings
- Hawley
- Hector
- Henderson
- Herman
- Heron Lake
- Hibbing
- Hinckley
- Hopkins
- Houston
- Howard Lake
- Hutchinson
- Jackson
- Janesville
- Jordan
- Kasota
- Kasson
- Kenyon
- Kerkhoven
- Lake Benton
- Lake City
- Lake Crystal
- Lakefield
- Lake Park
- Lamberton
- Lanesboro
- Le Roy
- Le Sueur
- Le Sueur Center
- Litchfield
- Little Falls
- Long Prairie
- Luverne
- Lyle
- McIntosh
- Mabel
- Madelia
- Madison
- Mankato
- Mantorville
- Mapleton
- Marshall
- Mazeppa
- Milaca
- Minneapolis
  - Central
  - East
  - North
  - South
  - West
- Minneota
- Montevideo
- Montgomery
- Monticello
- Moorhead
- Mora
- Morris
- Morton
- Mountain Lake
- New Prague
- New Richland
- New Ulm
- Northfield
- North St. Paul
- Olivia
- Ortonville
- Osakis
- Owatonna
- Park Rapids
- Paynesville
- Pelican Rapids
- Perham
- Pine City
- Pine Island
- Pipestone
- Plainview
- Preston
- Princeton
- Red Lake Falls
- Red Wing
- Redwood Falls
- Renville
- Rochester
- Royalton
- Rush City
- Rushford
- St. Charles
- St. Cloud
- St. James
- St. Louis Park
- St. Paul
  - Central
  - Cleveland
  - Humboldt
  - Mechanic Arts
- St. Peter
- Sandstone
- Sauk Center
- Sauk Rapids
- Shakopee
- Sherburn
- Slayton
- Sleepy Eye
- South St. Paul
- Springfield
- Spring Grove
- Spring Valley
- Staples
- Stephen
- Stewartville
- Stillwater
- Thief River Falls
- Tracy
- Two Harbors
- Tyler
- Virginia
- Wabasha
- Wadena
- Warren
- Waseca

Waterville
Welcome
Wells
West Concord
Wheaton
White Bear
Willmar
Windom
Winnebago
Winona
Winthrop
Worthington
Zumbrota

Graduates of the following private schools will be admitted to the freshman class under the same conditions governing admission of high school graduates, provided, that the regular four year course taken satisfies the specific requirements of the college to which entrance is desired and provided also, that the student be recommended by the principal of the school for admission to the University;

St. Mary's Hall, Faribault
St. Paul Academy, St. Paul
Shattuck Military Academy, Faribault
Stanley Hall, Minneapolis
Windom Institute, Montevideo
Concordia College, Moorhead
Pillsbury Academy, Owatonna
St. Joseph's Academy, St. Paul
Graham Hall, Minneapolis
Albert Lea College, Prep. Dept. Albert Lea
St. Paul's College, St. Paul Park
The Loomis School, St. Paul
The Backus School for Girls, St. Paul
The College of St. Catherine, St. Paul
St. Margaret's Academy, Minneapolis
The Winona Seminary, Winona
St. John's College, Collegeville
St. Thomas College, St. Paul
Villa Maria, Frontenac
Park Region Luther College, Fergus Falls

ADVANCED STANDING

The University accepts records from other colleges for credit to advanced standing. Such records are accepted so far as they are equivalent to the work done in this University, subject to the approval of the the divisions concerned. In bringing certificates from other institutions, the records must be on the official blanks of the institution granting the certificates, and should show:

I. The subject studied and ground covered.

II. The time spent upon each subject.

III. In case of laboratory subjects a concise statement of work done.

IV. **The result.** It is sufficient to state that the subject was creditably completed.

Students who desire to obtain advanced standing must present their applications and certificates to the Enrollment Committee, who will consult departments concerned in determining the credit to be given.

Graduates of the advanced graduate course of a Minnesota state normal school are admitted, and may substitute for college work such normal work as will be approved by the Enrollment Committee after consulting with the divisions concerned.

Individual graduates of the advanced Latin course (five years) or of the advanced English course (five years) of a Minnesota state normal school, who, on the basis of maturity and ability, present certificates of special fitness from the president of the normal school, will be admitted with advanced standing under the same regulations and proviso.

Applicants who have taken a college subject in their preparatory work may petition the Enrollment Committee to elect another subject in lieu of the one they have had. Before granting this petition the Committee may, if they desire, require the applicant to take an examination.

Students who desire advanced standing on subjects taken in accredited schools, and not used for entrance credits, will be required to take an examination.

Students desiring credit for practical work must present a detailed statement showing the nature of work done, and should give reference letters and recommendations, and take an examination.

Special Students: Graduates of the School of Agriculture may be admitted as special students and be allowed to pursue such studies in the course offered in the College of Agriculture as are approved by the faculty.

All students in the College of Agriculture must advise with the dean or Chief of the Division concerning all electives. No student is allowed to enter any course until such course is properly entered upon the student's registration card by the registrar of the Agricultural Department, and no credit shall be given for subjects in which the student has not been previously registered.

Registration of subjects. No student shall be permitted to register in any course for more than the regular schedule, nor for less than fifteen credit hours, in any one semester, without permission of the Students' Work Committee.

REQUIREMENTS FOR GRADUATION AND DEGREES

After the completion of the prescribed course of study, including all of the required work and the requisite amount of elective work equivalent to a total of 144 credit hours for the Agricultural and Home Economics courses, and 149 credit hours for the Forestry course, students in the course in agriculture will be recommended for graduation with the degree of Bachelor of Science in Agriculture, students in the course of forestry with the degree of Bachelor of Science in Forestry, and students in Home economics with the degree of Bachelor of Science in home economics.

Diplomas of graduates of the College of Agriculture who have taken specified courses in the College of Education are valid as first-grade professional certificates for two years, and at the expiration of two years of successful teaching, such diplomas, properly endorsed, have the force of first-grade professional certificates for life.

The teachers' course offers two years of work in home economics, equivalent to 75 credit hours. This leads to a certificate, but not to a degree.

Certificates issued to graduates of the teachers' course are valid as first-grade certificates for two years. At the expiration of two years of successful teaching, such certificates, properly endorsed, have all the force of first-grade certificates for life.

The elective studies designated as academic are to be chosen from the printed semester programs of work offered in the colleges of Science, Literature and the Arts; Law; Medicine; and Engineering; no student to take more than two semesters in either of the three last named colleges. The elective studies designated as agricultural are to be chosen from the printed program of work offered in the College of Agriculture.

GRADUATE WORK

Special facilities are offered to graduate students from this and other colleges who wish to become familiar with methods employed in experiment station work, and to pursue their collegiate studies further. Courses for major and minor subjects may be arranged by consulting the professors in the different divisions. Students who enter for advanced degrees, register with the committees on registration of the College of Agriculture and also in the Graduate School. They must take their major subjects in the College of Agriculture, but they may take one or both of their two minor subjects in the College of Science, Literature and the Arts or in the College of Engineering and Mechanic Arts. Graduate students registered in the Graduate School may take one or both of their minor subjects in the College of Agriculture.

I. The degree of Master of Science in Agriculture will be conferred on a bachelor of this or any other agricultural college of equal grade who, not sooner than one year after graduation, if a resident graduate student at this agricultural college, shall pass an examination in certain prescribed lines of study and present a satisfactory thesis in accordance with the requirements of the Graduate School.

II. All general regulations of the Graduate School governing candidates for the master's degree, method of selecting work, amount of work required, degree of proficiency expected, and the time and manner of conducting the examinations, apply to candidates for master's degrees in the College of Agriculture.

III. The Degree of Doctor of Science will be conferred by the Graduate School for study in the College of Agriculture on bachelors of this or any other agricultural college of equal grade within not less than three years after graduation therefrom under conditions prescribed by the faculty of the Graduate School.

FEES

All students in the college, who are residents of the State of Minnesota, are charged an incidental fee of ten dollars a semester. Non-residents are charged double the fee required of residents of the state, or twenty dollars a semester. No reduction is made for late entrance or for leaving before the end of the semester. In addition to this fee, students who take work in laboratories are charged a sum sufficient to cover the cost of material and breakage. A Gymnasium Fee of twenty-five cents per semester will be collected of each student. This fee constitutes the athletic fund, which is used in procuring such apparatus as the school does not provide. Students are required to deposit five dollars which will be credited to them in settlement of their accounts.

DAILY ROUTINE

The daily session is divided into eight recitation periods of forty-five minutes each, four in the morning and four in the afternoon. The morning session begins at 8:15 and closes at 11:30. A general assembly of the faculty and students of the College of Agriculture is held on Wednesdays at 11:40 o'clock. The noon hour extends from 12:15 to 1:15 o'clock. The afternoon session begins at 1:15 and continues until 4:30 o'clock. Work extends through six days of the week.

RULES AND REGULATIONS

Faculty Meetings: The Faculty meets regularly at 9 A. M., on the second Monday of each month of the college year.

Registration: (a) Registration shall consist of a written application to the Registrar of the College of Agriculture for enrollment in some one course of study in that college.

(b) Entrance conditions shall be removed before the student enters upon the work of the sophomore year. The Committee on Student's Work may grant an extension of time in special cases for good reasons. But in no case shall the student be allowed to enter upon the work of the junior yerr with an entrance condition unremoved, except by vote of the Faculty.

(c) **Time of**: Students are due to have their registration completed not later than the day previous to the day set for recitations to begin.

(d) No student shall be allowed to register after this date except by permission of the Faculty.

(e) Students shall be required to make up work lost through delay in registration just as in case of any other absence.

(f) All fees must be paid within the first week.

Evidence of: The class card is the only evidence of registration to be accepted by any instructor. No student shall be admitted to class after the first week unless his card is in the possession of the instructor.

Credit according to: Students shall not receive credit for work for which they have not been registered.

The Registrar has authority to grant change of registration from one subject to another any time during the first week of the semester. After that time no such change shall be made except by permission of the Committee on Students' Work.

Cancellation of: When students leave the college and request the cancelling of their registration, the instructor shall send to the Registrar a report of such student's work up to the date of leaving.

Senior second semester: No senior shall be allowed to register for the second semester who has a condition back of the senior year. No student shall be considered eligible for graduation whose conditions or other deficiencies are not completely removed by May first.

PETITIONS

Every petition to be acted upon at any particular meeting of the Faculty must be presented to the Dean and Secretary of the Faculty not later than forty-eight hours previous to the time set for such meeting.

Every student who desires to be heard in regard to his petition shall be given such an opportunity by the committee.

EXTRA WORK

No student who has been unable to carry successfully the regular work of any year shall be allowed to carry extra work in the succeeding year.

Students desiring to carry extra work shall notify the Committee on Students' Work at least one week before the beginning of the semester.

Application for work in excess of the prescribed course shall be granted by the committee only when the applicant has a record for good scholarship in all lines of his work for the previous year.

CONTROL OF CLASSES

Tardiness and absences shall be controlled by divisions on the general principle that each student must do the full work of his class.

No student whose absences in any semester exceed four weeks in the aggregate shall be admitted to examination without special permission of the Faculty.

When a student has been absent six times consecutively the instructor shall notify the Registrar that the student has ceased to attend class.

EXAMINATIONS AND REPORTS

Regular written examinations shall be held at the close of each semester in all classes in the freshman and sophomore years.

All classes in the senior and junior years shall be examined at the close of each semester, either orally or in writing, as the professor may direct; provided that in the special subjects requiring course examinations the regular semester examinations may be omitted, with the approval of the Dean, in which case the time assigned for examinations shall be given to some form of recitation or instruction.

The presentation of note book and theme shall not be accepted in lieu of examinations.

SENIOR SECOND SEMESTER

All seniors who have received no conditions or failures since the close of the freshman year shall be excused from the final examinations in all subjects in which their work and attendance have been satisfactory to the instructor concerned.

Special examinations are to be given only by permission of the Faculty and on a date set by the Faculty.

Conditioned Seniors: After the opening of the second semester no instructor shall give an examination to a member of the senior class, save for the work done in class during the semester.

All examinations to remove conditions shall be conducted by a Committee of the Faculty appointed for that purpose.

Examinations for Credit: Any student upon first registration at the University, may, with the approval of the Enrollment Committee, be allowed without charge to take examinations toward advanced standing for which the student declares himself ready, such examinations to be taken within the first six weeks of the college year.

Students who have made up work by themselves, may, by permission of the Committee on Students' Work, obtain credit for the same through examinations.

Cheating: In all cases of cheating in examinations or written exercises, the offender may be reported to the Faculty for such action as the case may require.

LEAVE OF ABSENCE

Any student intending to absent himself from college during any part of the college year must obtain a Leave of Absence from the Committee on Students' Work.

DELINQUENTS

Warned by instructor: Any student of the freshman class who has been warned that sixty per cent. of his work has been deficient at the end of the first six weeks of either semester and whose work is still similarly deficient at the end of the first twelve weeks, shall be immediately dropped from the rolls. He may be reinstated on probation by the Students' Work Committee subject to further action by the Faculty.

Registration refused: Any division may report to the Registrar two weeks before the end of the semester the names of any students pursuing any continuous course of study who have been doing such poor work as to make it impracticable for them to do the work of the following semester, and such students shall be refused registration for said course.

Registration cancelled: Provided also, that in case the final registration shows any student, who has not been previously reported, to be incapable of further pursuing the subject in a satisfactory manner, at the written request of the head of the division concerned, the Registrar shall cancel the student's registration for that subject.

Dropped from the Rolls:

(1) Any student receiving conditions or failures in sixty per cent. of his work in any semester shall be dropped from the rolls, and shall not

be allowed to re-enter the University until the opening of the corresponding semester of the following year.

Pursue Work Again: Any student of the freshman class who fails to pass in one-half of the prescribed work of the year shall be required on re-entering the University, to pursue again all the subjects of the year unless excused by the Committee on Students' Work.

Work Limited: Students who receive a condition or failure in the work of the first semester shall not be allowed to elect another subject in place of the subject in which the condition or failure was received, but shall be required to devote their full time to the remaining subjects of the course.

Exceptions to the rule shall be made only by the Committee on Students' Work after a full investigation.

Incompletes:

(1) When a student's work in a subject is, in the main, satisfactory, but incomplete, owing to absence from class, or failure to do on time a certain definite portion of the work which is only a small part of the entire work, and the reason for such absence or failure is satisfactory to the instructor, the work may be reported as "incomplete."

(2) An "incomplete" not removed before the end of the first month of the following semester becomes a "condition." The Committee on Students' Work may, in special cases, extend this time limit.

Conditions and Failures:

(1) A "condition" not made up before the subject is offered again becomes a "failure," subject to rules governing failures.

(2) Students conditioned in the work of the first semester are given an opportunity to remove their condition either at the end of the second semester or at the beginning of the first semester of the following year. Students conditioned in the work of the second semester are given an opportunity to remove their conditions at the beginning or end of the first semester of the following year, at the dates regularly set by the program for such examinations. It is provided that if a student attempts to remove a condition at the first examination, he shall not be allowed to try the following examination, but shall be required to take the work over in class. "Failures" must be taken over in class.

Eligibility Regulation: No student in this College with any "condition" or "failure" standing against him shall be eligible.

a. As a competitor in intercollegiate debate or oratory.

b. For membership on the editorial board of any student publication.

.c For membership in the Dramatic Club or in any student dramatic or musical organization which gives entertainments outside the University.

REQUIREMENTS FOR GRADUATION

(1) Every student shall do the work of the class with which he graduates, except that the student shall be free from any additional requirements for any year of which he has already completed the full work without condition.

(2) No person shall be permitted to graduate who has an incomplete, condition, or failure standing upon the books of the Registrar.

UNCLASSED STUDENTS

(1) Unclassed students must take the same number of hours as regular students, and, unless advanced standing is obtained through credits from other institutions, four-fifths of the work during the first year must be taken from the subjects offered to freshmen. The Committee on Enrollment may allow exceptions in cases of persons of mature age, upon recommendation of the division concerned. A new application must be made each semester to the Enrollment Committee.

(2) Unclassed students shall not be admitted to the work of either semester after the fourth week.

SCHOLARSHIPS

It is the policy of the University to establish scholarships in the different departments where extra help is needed for instruction under regulations somewhat as follows:

(1) The appointments are made by the Executive Committee of the Board of Regents upon the recommendation of the Department in which the appointment is desired, after approval by the Faculty.

(2) Recipients of scholarships may be either graduate or undergraduate students.

(3) The scholarships are not intended as gifts or as benefactions from the state to the recipients, but as provisions under which services may be rendered the University.

(4) It is understood that these services are of a nature which shall assist the holder of a scholarship to attain the mastery of some line of work in the department in which he is appointed.

MISCELLANEOUS

Disturbances: Class meetings are held to be solely for the class calling the said meeting, and in case of disturbance and damage to property, those who are known to be present and not members of the class, shall be held responsible for the damage done, even though it may be shown that they did not do the actual damage.

Class Parties: No class party or public entertainment, for which members of the class shall be held bound in honor to contribute, shall be given without previous permission of the faculty.

ORGANIZATIONS

Philomathian Literary Society is an organization of the students of the College of Agriculture, its object being to train its members in the art of public speaking, debating and parliamentary practice. The society is co-educational and its membership limited to forty. Meetings occur weekly, and programs, including readings, recitations, debates and speeches, are presented. Visitors are welcome.

The Forestry Club is an organization of students in the Minnesota Forest School. Enthusiasm and goodfellowship are the sole requirements for admission. The Club runs a house for the benefit of its members. Meetings are held fortnightly and speakers of prominence are presented. The object of the Club is threefold: to keep its members up-to-date on forestry matters, to promote goodfellowship, and to create and cherish true college spirit.

The Agricultural Club is an organization of the men of the College of Agriculture. The membership is unlimited. Regular meetings are held bi-monthly. The object of the Club is to keep its members up-to-date along lines of general interest; first, by providing speakers of recognized ability, second, by provoking timely discussion. Especially are those subjects discussed upon which very little literature is available. The social side is not overlooked.

The Dairy Club is an organization of students especially interested in the subjects of dairying. Already a large and enthusiastic membership have been drawn from College and School. Meetings occur fortnightly and give the students a much needed opportunity to thresh out for themselves the theories of the class room. The evenings are occupied by talks and debates. Enthusiasm is the only requirement for admission.

The Home Economics Club is a limited membership organization of women in the College of Agriculture. The object of the Club is to promote social life among the women of the College. A reception is given to freshmen girls at the beginning of each year. Another feature is the monthly spreads given in Shevlin Hall when the girls are addressed by prominent women workers of the Twin Cities.

The Home Economics Association is an organization of the women of the College of Agriculture. Membership is unlimited. The object of the Association is to keep its members up-to-date on home economic movements throughout the country, as well as to give organized backing to any movement for the betterment of the College. It is the ambition of the Association to have a building of its own in the very near future.

PUBLICATIONS

Forestry Publication: The "Minnesota Forester" is the official organ of the Minnesota State Forestry Association. It is edited by the Forestry Department of the University and is devoted to the advancement of the forestry movement with special emphasis on farm forestry.

Minnesota Farm Review: This paper is published and managed by the Alumni Association of the School of Agriculture. It is the official organ of the Alumni Association and the Farmer's Club. The Review is intended to be a medium through which former students may keep in touch with the Agricultural School and with one another. It also endeavors to bring the farmers of the State into closer touch with the school, the college, and the Experiment Station. To this end, the paper strives to present the latest progress in the experimental work of the various stations and to call attention to the most practical farm practices.

University Farm Press News: An instrument used by the Extension Division for the purpose of keeping the public informed of the work done at the Department of Agriculture of the University of Minnesota, as well as to keep the public posted on new developments in agriculture, is a small sheet of information published semi-monthly and known as the **University Farm Press News.** This sheet is mailed to all papers in the state but is not for general distribution.

The Minnesota Farm Library: The Extension Division publishes monthly a small popular bulletin under the caption, **Minnesota Farm Library.** Each one of these bulletins will deal in a popular and interesting way with some phase of farm life. Most of them will be extracts from technical bulletins published by the Minnesota Experiment Station or other agricultural institutions. The attempt will be to present the technical matter from these publications in a more simple and interesting manner than is done in the ordinary station bulletin. The **Minnesota Farm Library** will be mailed free monthly to any citizen in Minnesota so desiring.

GIDEON MEMORIAL FUND

In honor of Peter M. Gideon, the pioneer in developing new fruit and the originator of the Wealthy apple, the Minnesota State Horticultural Society has raised a fund of five hundred dollars, which has been placed with the Board of Regents for investment. The income from this fund is to be expended by the Professor of Horticulture of the University of Minnesota for prize essays on some suitable horticultural subject. This prize money will be awarded at the close of each year.

ARMOUR SCHOLARSHIP

Through the exhibits of live stork at the International Exhibition in 1908, the College of Agriculture has been awarded one of the J. Ogden Armour Scholarships, amounting to $250.00, which is to be awarded to some worthy student in the Agricultural College. This scholarship will be available during the next college year.

LIBRARY

The Agricultural Library is well equipped for supplying the needs of both undergraduate and graduate students. It contains more than 15,500 volumes of general and technical literature, Government reports, etc., besides 40,000 unbound pamphlets, bulletins and reports. The general subject and author card index and the index of publications of the State Experiment Stations are always at the disposal of students to aid them in locating the various sources of information which the Library affords.

There are complete sets of all standard encyclopaedias and dictionaries and files of over 225 popular and technical magazines and periodicals.

The Librarian and her assistants are always ready and glad to give whatever assistance they can, both to those interested in special research work and to those doing regular reference work in connection with their classes. All those wishing to read or study are made welcome and given whatever privileges the library can provide.

COURSE IN AGRICULTURE

The course in agriculture is designed to give the student a broad education in the sciences and arts relating to agriculture and to fit him for the work of agricultural specialist. The physical and biological sciences are made prominent. The work in these subjects is begun in the first or second year and may be continued throughout the course. For the first two years, the lines of study are prescribed, the subjects being chosen with a view of giving a good foundation for the work which follows. For the last two years, some elective work is offered, giving the student an opportunity to take work along certain lines for which he has a special aptitude and liking.

Six months' practical farm experience is required of each candidate for graduation. It is expected that the work be done on some accredited farm on which improved methods and appliances are in use. This work can be performed during the summer vacations under the guidance of the head of the division in which the student is specializing.

In the College of Agriculture a portion of the work is taken in the College of Science, Literature and the Arts. All academic electives and the prescribed work in geology, German, French, botany, zoology, psychology, English, literature, economics and education are taken in the College of Science, Literature and the Arts. The agricultural electives and the prescribed subjects not mentioned above are taken at University Farm.

The classes in the College of Agriculture begin with the opening of the regular University year (for which see calendar).

AGRICULTURE

Equipment: The equipment for instruction in agriculture consists of the following: Special laboratories and class rooms with modern apparatus for all courses, collections of classes and varieties of all field and weed seeds; herbariums of weeds and grasses indigenous to the state; a germinating room which affords opportunity for a study of the vitality and strength of seeds; charts and models of various details of crops together with bulletins on farm management, the cost of farm production, and other pertinent topics supplement the daily lectures; machinery used on University Farm and generously loaned by the firms of the Twin Cities affords valuable subjects for instruction work. The fields and plots of the Experiment grounds offer additional facilities and subjects for use in class work. The student's home and farm is at all times made the basis of his particular study.

The State Grain Inspection department, elevators, mills and adjoining farms of the Twin Cities and vicinity furnish a study for the merchandizing of grains and the planning of farms. An agricultural museum, now being equipped, will contain much material that will be instructive and historic, and serve to show the close relations of agriculture and the modern industries.

Standard references upon agriculture are provided for an exhaustive study of any branch of this subject and original research is a prominent factor of the agricultural course.

AGRICULTURAL CHEMISTRY

Equipment: A special laboratory with modern apparatus for the analysis of foods and agricultural products is provided. The equipment contains a Berthelot-Atwater calorimeter for the determination of the caloric value of foods, vacuum ovens, apparatus for the chemical and microscopical analysis of foods and the necessary facilities for human and animal food investigations. Special facilities are offered in testing wheat, flour and cereal products for commercial purposes. Nutrition investigations, including the digestibility of foods, the chemical changes which take place in cooking, and the losses in the preparation of foods form a part of the Experiment Station work. This offers an opportunity for students to study methods of investigation relating to human food problems. Laboratory practice is also offered to advanced students in the study of household problems in which chemistry is involved and in investigation of special problems in Agricultural Chemistry. Standard reference books and journals, including Jahresbericht der Agricultur Chemie, Comptes Rendus, Biedermann's Centralblatt, Annales de la Science Agronomique and Versuchs-Stationen are provided for the advanced work in agricultural chemistry.

Fees: In all the laboratory courses in agricultural chemistry a fee is charged to cover the cost of material used and breakage. In general and qualitative analysis the student pays the same fees as required of other students in the College of Science, Literature and the Arts. The student is assigned a certain amount of apparatus and material for which he gives a receipt, and deposits $3.00 with the accountant before beginning work. All apparatus returned in good condition at the close of the term is credited to the student's account upon settlement.

AGRICULTURAL ENGINEERING

This division includes the work in mathematics, physics, drawing, shop practice, and the general principles of engineering mechanics and frame construction as they apply to agriculture. The object being to combine in each course such engineering features as will enable the student to preform the more simple engineering operations which will occur in the work of his chosen course, and will further prepare him to understand the principles underlying the more complicated problems of engineering and thus enable him to properly interpret plans and specifications and to carry on investigations in connection with engineers.

The division is fairly well supplied with apparatus, instruments, charts and photographs for properly demonstrating the work.

ANIMAL HUSBANDRY

Equipment: Representatives of some of the leading breeds of cattle, sheep and swine, are kept at University farm and herds of blooded stock near the institution and the annual show of live stock at the state fair serve for extended observation of breeds and methods of management. Each year a number of experiments are under way in the feeding of these classes of animals. Breeding experiments are also undertaken with sheep and swine, and theoretical experiments with the smaller animals. Experiments in·summer feeding cattle, sheep and swine wholly or in part on pasture are carried on each year. The new live stock building affords excellent accommodations for class work in stock judging.

ANIMAL NUTRITION

The work in Animal Nutrition offered to students of the College of Agriculture is laid out as a four years' course leading to the degree of Bachelor of Science in Agriculture.

The economic relation of foods to the kinds and character of energy expended by the animal body is a subject of vital importance to live stock owners. It is a subject which has received no small amount of time in experiment work from the dairy division of this institution. The facilities in the way of laboratory equipment, as well as numerous animals for experiment purposes, are adequate for giving students a thorough scientific training in this subject. The dairy herd and some sixty head of nutrition steers are constantly kept for investigation work.

Great stress is laid on chemical, biological and physical phenomena affecting these problems, and to this end a thorough training in this science is given.

DAIRY HUSBANDRY

Equipment: Students in the college course have the advantages of the equipment of the dairy school. The feeding and breeding experiment in the dairy division of the experiment station serves a most useful purpose in the collegiate instruction. The cordial relations existing between the department of agriculture and other state institutions are often advantageous to college students well advanced in dairy work.

Specimens of several breeds of cattle are kept for class use. Herds in the vicinity and those shown at the state fair are useful to students in this course.

This course is designed to meet the needs of those desiring a thorough knowledge of dairying. It will equip graduates for responsible positions as managers of large butter and cheese factories, stock farms, or for positions as instructors in dairy schools. Applicants must have had at least three months' experience in a creamery or cheese factory, for which three credit hours are allowed.

ENTOMOLOGY

Equipment: Well lighted laboratories with modern equipment are at the disposal of college students for both undergraduate and graduate work. Instruction is further aided by an excellent series of charts and lantern slides. The department is well equipped with museum specimens convenient to the lecture room, showing not only a large series of insects injurious and otherwise, over 10,000 specimens, but also birds and other animals which have a direct bearing upon agriculture. A good museum is also a valuable auxiliary in instruction and friends of the institution are urged to contribute specimens which illustrate the animal resources of the state. Excellent facilities for the installing and caring for specimens are offered.

In economic work the student is brought into direct contact with spraying apparatus and insecticides. Practical work in bee keeping is offered in our apiary, and experiments in insect life can be carried on by advanced students in the insectary at nearly all seasons of the year.

A course in Insects and Diseases is offered in view of the fact that of late years various insects or insect-like animals have been found to play a very important and hitherto unrealized part as carriers and transmitters of disease, and thus have a very important bearing upon the health of man.

Laboratory Fees: To cover cost of material, breakage, etc., a fee of three dollars is charged each student in the course in Forest Entomology, and two dollars in Economic Entomology, the amount of the fee being deposited with the accountant before beginning work.

FORESTRY

Graduate and under graduate courses are offered in forestry. These prepare men to take charge of private forest property, for the Government Forest Service, or for positions as teachers.

The graduate course may be completed in two years, and requires college training for admission. Graduates of universities, colleges, or scientific institutions of high standing, are admitted to the graduate course upon presentation of their diplomas, provided they have had courses in elementary botany, general geology, inorganic chemistry, physics, mathematics through trignometry, economics and modern languages. Those who complete the graduate course in forestry receive the degree of Master of Science in Forestry.

The undergraduate course requires four years for its completion, and leads to the degree of Bachelor of Science in Forestry.

Although it is a course leading to a technical degree in a specialized science, it is nevertheless based on broad enough lines to afford a good general scientific education. The forester in his lonely life in the woods is very frequently thrown largely upon his own resources and should be capable of obtaining pleasure and interest out of all his surroundings. For this reason an attempt is made to give the student in addition to a thorough training in technical forestry, a good working knowledge of all the sciences and other lines of study which touch upon his life in any way.

Special emphasis is laid on the value of field work and excursions. Every student is required before graduation to take four weeks' work in some lumber camp, so as to become familiar with common lumbering operations. There will also be excursions to nearby forests, to lumber camps, saw mills, wood manufacturing and paper mills; to the Boom Company's work on the Mississippi river; to nearby nurseries; and it is expected that arrangements will be made which will afford an opportunity for students to visit some of the forests of Montana, Idaho and Washington, at a very low rate.

Equipment: The vast lumbering operations in the northern part of Minnesota offer the best opportunities for a study of that branch. The establishment of the Chippewa Forest Reserve and its management by the Forest Service give opportunities which few other sections possess to study the best methods of forest management. The state has twenty-one thousand acres of timber to be used as a forest and game preserve, on which student help will be largely used. Itasca State Park, 22,000 acres in extent, is used by the Forest School as a demonstration forest and experiment station. Every student spends about twelve months in the park during his course and does practical work in all branches. The use of this park gives the Minnesota Forest School a forest equipment which is unsurpassed anywhere.

Throughout the year, special lectures will be given by the State Forestry Commissioner, the State Game Warden, the State Fish Commissioner and prominent lumbermen and lumber manufacturers of Minneapolis and St. Paul. This touch with the commercial side of the lumber business is very important and the situation of the school makes it possible to offer a great deal of it. Other special lectures will be given as opportunity offers.

HORTICULTURE

Equipment: The work in the division of horticulture is mainly carried on at University Farm. About twenty acres is here used for the field work in this line. The horticulture building furnishes excellent facilities for class room and laboratory exercises. The special work in breeding and testing fruits is carried on at Zumbro Heights, Carver County, where eighty acres of land are devoted to this purpose and equipped with suitable greenhouse, storage cellar, barns, etc., affording excellent facilities for this line of investigation.

The campus of the School of Agriculture is planted out with a collection of trees, shrubs, and herbaceous plants suitable for this section, the specimens of which are labeled with their common and botanical names. The parks, greenhouses, orchards and nurseries of the near vicinity afford convenient and satisfactory illustrations of the best commercial methods and ornamental planting. Our facilities in this line are unexcelled, perhaps, by any other college in the country.

The greenhouses, laboratories and class rooms of the division of horticulture are well equipped with modern apparatus. The division library contains a large number of horticultural works and is further supplemented by a card index to all its literature.

HOME ECONOMICS

The work in home economics offered in the College of Agriculture is a four year course leading to the degree of Bachelor of Science in Home Economics, and is open to graduates from the School of Agriculture who have taken the work of the intermediate year, and to graduates of approved high and normal schools, provided they have had at least an elementary course in chemistry. It is intended to bring to the vocation of home making the same kind of help which the course in agriculture brings to the business of farming. Aside from the universal need of education of this character, there is a marked and increasing demand for trained women to fill institutional and administrative positions as competent supervisors of supplies and of hygiene where large numbers are cared for in collective housekeeping, as well as for special teachers in the several divisions of home economics.

Lectures at the University Training School for Nurses are open to seniors. The course opens during the second semester and consists of the elements of nursing, dietetics, etc. Due credit will be allowed for all work taken.

Graduates of other reputable colleges can here secure a Bachelor's Degree by devoting two years to the subject of home economics. The major work must be done in home economics, and one or both of two minors must be completed under the advice of the college committee in one of the other divisions of the College of Agriculture, or in the College of Science, Literature and the Arts. When approved by the Dean and committee, other subjects given in these colleges may be substituted for the prescribed subjects in the course in home economics.

Women who are sufficiently advanced may study music or art during the junior or senior years, provided that no student may receive more than two semesters' credit in music and art together.

TEACHERS' COURSE IN HOME ECONOMICS

In addition to the four year course, a two year teachers' course is offered in home economics, which includes many special technical subjects given in the four year course in the College of Agriculture at the University Farm, but does not include all the required general cultural studies of this course.

Teachers' Certificate: Certificates issued to graduates of the Teachers'

Course are valid as first grade certificates for two years. At the expiration of two years of successful teaching, such certificates, when properly endorsed, have the force of first grade certificates for life.

SOILS

Equipment: The department is equipped with laboratories for elementary and advanced students. A large collection of soils from Minnesota and other states is available for purposes of study, including soils that have been under short and long periods of cultivation where different systems of farming have been practiced. Special facilities are offered for the study of the organic matter of the soil and its influence upon the chemical and physical properties of soils. The laboratory is provided with apparatus for the physical and chemical analysis of soils and for the study of special problems in relation to soil fertility. The library contains many of the standard periodicals and reference books upon soils and fertilizers. As soil investigations and a study of the soil areas of the state form a feature of the Experiment Station work, opportunity is offered for practical experience in the study of soil problems in relation to crop production.

Fees: Students pay a laboratory fee of $3.00 for courses 3, 4, 5 and 6: this is to cover cost of chemicals and material used. Students also pay the cost of breakage of apparatus entrusted to their care.

VEGETABLE PATHOLOGY AND BOTANY

Equipment: The work of this division is designed to assist the student in correlating the fundamental facts and theories of botany and the practical problems of agricultural and horticultural work. The laboratories, library, and demonstration material are well arranged and equipped to enable the student to accomplish this correlation. The greenhouse and the abundant opportunities for observing plant life on the grounds and station farm furnish further excellent facilities. The plant and seed collections including especially the plant diseases, are made useful to the student. A special field for diseases and weed investigation is maintained on the station farm. Problems of agricultural botany and plant disease work are features of the division.

VETERINARY MEDICINE AND SURGERY

Equipment: The veterinary building gives ample facilities for good work. The hospital furnishes cases for study and demonstration and the dissecting room affords material and opportunity for studying the digestive organs, anatomy of conformation and type, and locomotor apparatus. A large and well stocked museum contains ample material for illustration.

Instruction is given by text books, lectures, collateral reading, and by practice work. The lectures are illustrated by means of stereopticon, skeletons, manikins, charts and by the living animal. Anatomy of locomotion, conformation, the digestive organs, and the higher physiology of digestion are given prominence.

Infectious diseases of domestic animals are studied with reference to causes, recognition, prevention and methods of control. Certain medicines which the intelligent stockman should understand are studied with reference to uses and methods of administration.

Courses 2 and 4 are laboratory courses and students taking either course deposit $3.00 with the accountant for material used. Actual cost is charged and unused balances are returned.

OUTLINE OF COURSE IN GENERAL AGRICULTURE

FRESHMAN YEAR

First Semester		Second Semester	
3	German (1) or French (1)	3	German (1) or French (1)
3	Agronomy (Agri 1)	3	Botany (1)
3	Botany (1)	3	Rhetoric (1)
3	Rhetoric (1)	3	Trigonometry (Ag Eng 2)
3	Physiography (Geol 2)	3	Qualitative Analysis (Chem 4)
3	General Chemistry (3)	3	Dairy Husbandry (10)
	Military Drill		Military Drill

SOPHOMORE YEAR

First Semester		Second Semester	
3	Botany (2)	3	Elective An.Husb. or Agr. or Botany
3	German (3) or French (2)	3	German (3) or French (2)
3	Rhetoric (2)	3	General Horticulture (10)
3	Livestock Husbandry (1)	3	Mechanical Drawing (Ag. Eng. 4)
3	General Zoology (1)	3	Rhetoric (2)
3	Agricultural Chemistry (1)	3	General Zoology (1)
	Military Drill		Military Drill

JUNIOR YEAR

First Semester		Second Semester	
3	Elementary Economics (1)	3	Agricultural Economics (Agr)
3	Eco Entomology (2)	3	Agricultural Physics (Ag Eng 11)
3	*Principles of Animal Nutrition (1)	3	Farm Engineering (Ag Eng 12)
3	Vegetable Pathology (Veg Path 1)	3	Veterinary Science (1)
3	Agricultural Elective	3	General Elective
3	Soils (Soils 1)	3	Fertilizers (Soils 2)

Students intending to specialize in horticulture may substitute for this course: Farm Forestry, ½ semester, and Nursery Practicums, ½ semester

Note: Electives should be chosen in consultation with the Chief of the Division in which the student intends to specialize.

OUTLINE OF SENIOR YEAR IN HORTICULTURE

First Semester		Second Semester	
3	Agricultural Economics (Ic)	3	Plant Breeding (Hort 7)
3	Thremmatology (Agri 4)	3	Floriculture (Hort 5)
3	Landscape Gardening (Hort 6)	3	Commercial Fruit Growing (1)
3	Systematic Pomology (8)	3	Market Gardening (2)
3	Academic Elective	1½	Spraying Materials & Comps (9)
3	General Elective	1½	Greenhouse Construction (11)
		3	General Elective

Electives to be selected on approval of Chief of Division.

OUTLINE OF SENIOR YEAR IN AGRONOMY

First Semester		Second Semester	
3	Farm Management (Agri 11)	3	Farm Management (Agri 7)
3	Field Crops & Seeds (Agri 3)	3	Grain & Corn Judging (Agri 12)

3	Farm Structures (Ag Eng 8)	3	Plant Breeding (Agri 5)
3	Agricultural Botany (Ven P 3)	3	Agronomy Elective
3	Thremmatology (Agri 4)	3	Agricultural Elective
3	Agronomy Elective	3	Agricultural Elective

Electives to be selected on approval of Chief of Division.

OUTLINE OF SENIOR YEAR IN ANIMAL HUSBANDRY

	First Semester		Second Semester
3	General Physiology (Zoo 5)	3	General Physiology (Zoo 5)
3	Dairy Stock Feeding (8)	3	Live Stock Feeding & Management (7)
3	Farm Meats (An Husb 10)	3	Farm Management (Agri 7)
3	Poultry (An Husb 2)	3	Animal Breeding (6)
3	Stock Judging (An Husb 5)	3	Animal By-Products (12)
3	General Elective	3	General Elective

Electives to be selected on approval of Chief of Division

OUTLINE OF SENIOR YEAR IN ANIMAL NUTRITION

SENIOR YEAR

	First Semester		Second Semester
3	Nutrition Research (An N 2)	1½	Nutrition Research (An H 4)
3	General Physiology (Zoo 5)	1½	Physiology of Nutrition (Vet 3)
3	Stock Judging (An H 5) and (Dairy H 1)	1½	Anatomy of Digestion (Vet 2)
3	Embryology & Histology (Z 3)	1½	Thesis on Nutrition
3	Dairy Stock Feeding (8)	3	Analysis of Foods (Ag Chem 7)
3	Chemistry of Foods (6)	3	Embryology & Histology (Zoo 3)
		3	General Physiology (Zoo 5)
		3	General Elective

Electives to be selected on approval of Chief of Division

OUTLINE OF SENIOR YEAR IN DAIRY HUSBANDRY

SENIOR YEAR

	First Semester		Second Semester
3	Dairy Stock Judging (Dairy 1)	3	Factory Butter Making (Dairy 3)
3	Farm Structures (Ag Eng 7)	3	Dairy Bacteriology (5)
3	Gen Physiology (Zoo 5)	3	Physiology of Nutrition (5)
3	Cheesemaking (Dairy H 4)	3	Veterinary Elective
3	Dairy Stock Feeding (8)	1½	Dairy Bacteriology (7)
3	General Elective	1½	Dairy Farm Management (6)
		1½	Nutrition Research (2)
		1½	Animal Nutrition Research (4)

Electives to be selected on approval of Chief of Division.

OUTLINE OF COURSE IN FORESTRY

FRESHMAN YEAR

	First Semester		Second Semester
3	Mech. Drawing (Ag Eng 4)	3	Trigonometry (Ag Eng 2)

3	General Botany (1)	3	General Botany (1)
3	German or French (1)	3	Meterology (Geol 4)
3	Physiography (Geol 2)	3	German or French (1)
3	Rhetoric (1)	3	Rhetoric (1)
3	General Chemistry (3)	3	Qualitative Chemistry (4)
3	General Forestry (1)		

SOPHOMORE YEAR

First Semester		Second Semester	
3	Advanced Botany (2)	3	Advanced Botany (2)
3	Advanced Rhetoric (2)	3	Drendrology & Plant Prop (2)
3	General Zoology (1)	3	General Zoology (1)
3	German (III) or French (II)	3	German (III) or French (II)
3	Elements Economics (1)	3	Advanced Rhetoric (2)
3	Drendrology (2)	3	Forest Engineering (Ag Eng 13)

JUNIOR YEAR

First Semester		Second Semester: Feb. 1 to April 15	
3	Landscape Gardening (Hort 6)	2	Forest Mechanics (Ag Eng 7)
3	Silviculture (3)	2	Forest Protection (4)
3	Physiology & Ecology (Bot 3)	2	Physiology & Ecology (3)
3	Forest Entomology (3)	2	Forest Entomology (3)
3	Wood Technology (Veg Path 2)	2	Veterinary Science (1)
3	Vegetable Pathology (1)	1½	Silviculture (3)
2	Live Stock Husbandry (1)		
1	Game & Fish (Ent 8)	1½	Silviculture (3)
	April 15 to Sept. 1	3	Forest Engineering (Ag Eng 14)
		3	Forest Mensuration (5)
		1	Forest Tree Diseases (Field Work)
		1	Foreign Forestry (13)

SENIOR YEAR

First Semester		Second Semester: Feb. 1 to April 15	
3	Agronomy (Agri 1)	6	Seminar (15)
3	Lumbering (7)	3	Lumber Manufacturing (12)
3	Forest Economics (10)		
3	Forest By-Products (9)		April 15 to June 1
3	Forest Management (8)	3	Working Plans (14)
3½	Wood Preservation (19)	1	Business Law (For 11)
1½	Testing Laboratory (18)	1	Packing (6)

OUTLINE OF COURSE IN HOME ECONOMICS

FRESHMAN YEAR

First Semester		Second Semester	
3	German (1) or French (1)	3	German (1) or French (1)
3	Rhetoric (1)	3	Rhetoric (1)
3	Botany (1)	3	Botany (1)
3	Domestic Sci (1)	3	Domestic Science (2)
3	Domestic Art (1)	3	Domestic Art (2)
3	General Chemistry (3)	3	Qualitative Chemistry (4)

SOPHOMORE YEAR

FIRST SEMESTER
3 Domestic Science (3)
3 German (2) or French (2)
3 Principles of Teaching (Ped 1)
3 General Zoology (1)
3 Library Methods (1)
3 Domestic Chemistry (2)

SECOND SEMESTER
3 Domestic Art (3)
3 German (2) or French (2)
3 Industrial Education (Ped 2)
3 General Zoology (1)
3 General Bacteriology (Dairy Hus 9)
3 Domestic Economics (1)

JUNIOR YEAR

FIRST SEMESTER
3 Elementary Economics (1)
3 General Physiology (Zoo 5) or History of Education (1)
1 Hygiene (Dom Eco 5)
1 Meats (An Husb 3)
1 Entomology (1)
3 Chemistry of Foods (Ag Chem 6)
3 Freehand Drawing (Drawing 1)
3 The Home (Dom Eco 2)

SECOND SEMESTER
3 Mechanical Drawing (Ag Eng 4)
3 Domestic Service (Dom Eco 3)
3 Dairy Husbandry (10)
3 Textiles (Dom Art 3)
3 General Physiology (Zoo 5) or History of Education (1)
2 2 Methods in Domestic Science
1 Poultry (An Husb 2)

SENIOR YEAR

FIRST SEMESTER
3 Domestic Economics (4)
3 Household Art (Dom Art 5)
3 Household Mechanics (Agr Eng 10) and Household Sanitation (Dom Sci 5)
9 Electives

SECOND SEMESTER
3 Domestic Science (6)
3 Agronomy (9) or Horticulture (5)
3 Handicraft (Dom Art 6)
9 Electives

OUTLINE OF TEACHERS' COURSE

FIRST YEAR

FIRST SEMESTER
3 Rhetoric (1)
3 Principles of Teaching (Ped 1)
3 Botany (1)
3 Elements of Domestic Science (1)
3 Elements of Domestic Art (1)
3 General Chemistry (Agr Chem 3)

SECOND SEMESTER
3 Rhetoric (1)
3 Botany (1)
3 The Family (Dom Eco 1)
3 Domestic Science (2)
3 Domestic Art (2)
3 Qualitative Chemistry (4)

SECOND YEAR

FIRST SEMESTER
3 Methods in Domestic Sicence (3)
3 Plant and Animal Life (Ped 3)
3 General Zoology (1)
3 The Home (Dom Eco 2)
3 Library Methods (1)
3 Domestic Chemistry (2)

SECOND SEMESTER
3 Domestic Art (3)
3 General Zoology (1)
3 General Bacteriology (Dairy H 9)
3 Industrial Education (Ped 2)
3 Agricultural Chemistry (1)
3 Agronomy (Argo 9)

Courses of Study

AGRICULTURE

Andrew Boss, Professor of Agriculture and Chief of Division
C. P. Bull, B.Agr., Assistant Professor of Agriculture
T. P. Cooper, B.S. in Agr., Instructor in Agriculture
A. C. Arny, B.S. in Agr., Instructor in Agriculture

1. Agronomy — Mr. Arny

Three credits (two lecture and two laboratory hours per week) First semester
Open to freshmen.

A study of the principles and effects of crop rotation supplemented by the working out of rotations suited to different farms and types of farming; the value, care and use of barnyard manures; bacteria as related to soil fertility; weeds in relation to crop production and farm profits; plant selection and breeding methods; seed selection; the use and care of meadows and pastures; the planting, cultivating, harvesting, storing and marketing of field crops.

2. Farm Machinery — Professor Boss

Two credits (four hours per week) — Second semester
Open to juniors and seniors. Elective.

Practical suggestions and practice work are given in connection with the best methods of adjustment, handling and adaptation of the various kind of machinery to the soils, weeds and seasons. Durability and convenience in manipulation are chief among the points considered.

3. Field Crops and Seeds — Assistant Professor Bull

Three credits (three hours per week) — First semester
Open to seniors.

Students registering for the course must have had at least one year's work in University botany. The course is outlined to occupy two lecture periods and two laboratory periods per week.

(a) Seeds: Their Identity and Value

In this course the students are made acquainted with the physical botany, the uses, identification, vitality, testing, grading and judging of all classes of field seeds. Special attention is given to the reproducing value of seeds of various grades of grains and to the importance of testing. A thesis upon some phase of the subject of seeds is required for full credit.

(b) Field Crops: Their Structure and Use.

In this course are considered the botany, cultivation and economic value of the various cereal, forage, root, fiber, sugar and miscellaneous crops. Special attention is given to the subjects of meadows, pastures, soilage crops, and to the production and preservation of all kinds of dry cured and ensilaged crops.

4. THREMMATOLOGY ASSISTANT PROFESSOR BULL

Three credits (three hours per week) First semester

Open to juniors and seniors who have completed Botany 1 and Zoology 1. Elective. Given in alternate years. 1912–13.

Heredity, variation, laws of breeding, the art of breeding, improvement by nature and under scientific experimentation, securing foundation stocks, value of using very large numbers, immense value of the occasional individual which can transmit qualities of peculiar value, use of an ideal, use and misuse of the score card, both numerical and graphic, intrinsic qualities, fancy points and distinguishing marks, statistical methods in breeding pedigree records of efficiency, fundamental principles underlying the arrangement of the record books, bibliography and terminology, study of literature of breeding.

5. PLANT BREEDING ASSISTANT PROFESSOR BULL

Three credits (three hours per week) First semester

Open to seniors and those who have completed Botany 1 and Thremmatology. Required. Given in alternate years. 1911–12.

Botany of the reproductive organs of field crops, field crop nursery management, producing new qualities by hybridizing and by change of environment, hybridizing versus cross-breeding, in-breeding and self fertilization, originating varieties and improving standard varieties by selection and by hybridizing, followed by selection, methods of disseminating new varieties, seed and plant introduction, experimentation in the theories relating to heredity, variation and practical breeding, seed growing as a farm business, seed merchandizing, and the breeding of each of the various field crops grown in Minnesota.

6. AGRICULTURAL ECONOMICS (Economics 1b) MR. COOPER

Three credits (three hours per week) Second semester

Open to juniors. Economics (Course 1) prerequisite.

The history and modern development of agriculture; problems of rural life and the movements affecting agricultural population. Agricultural systems and organizations; agricultural finance; the relation of agriculture to other industries and consideration of the various economic movements affecting and related to agriculture.

7. FARM MANAGEMENT PROFESSOR BOSS

Three credits (three hours per week) Second semester

Open to seniors. Course 11 prerequisite.

This course is offered with a view to emphasizing the business side of farming including the systematic arrangement of crops in rotation; the adjustment of crops to location, markets and live stock; the effect of cropping systems on soil productivity and crop yields; the regular employment of capital and the employment and distribution of labor. Special attention is given to drafting and revising farm plans. Each student is required to draft a plan of a farm in which he is interested where some specialized type of farming is followed; to submit a business statement of the fixed and operating capital employed together with the cost of operation, the revenue and the net profit.

9. AGRONOMY MR. ARNY

Three credits (three hours per week) Second semester

Open to seniors in home economics. Elective.

A study of the principles governing the science of agriculture and their relation to farm life; a brief study of the origin, formation and cultivation of soils; the movement and control of soil moisture; the conservation of soil fertility by systematic rotation and the use of fertilizers; bacteria in their relation to soil fertility; methods in plant improvement. The larger part of the time given to this subject will be devoted to a study of the cereal, sugar and fiber crops from the standpoint of producer and consumer. Special consideration will be given to the crops and their by-products that are largely used for human food. The course is intended to give such an insight into farming as a business and into farm life that those taking it may be better able to lend their influence toward bringing about healthy ideas and surroundings for life in the country.

10. Agricultural Economics (Economics 1 C) Mr. Cooper
Three credits (three hours per week) First semester
Open to seniors. Elective.

Agricultural Economics (Course 6) prerequisite. Development of agricultural laws as applied to drainage, water rights, irrigation, land contracts and leases. The fundamental principles underlying contracts; laws governing negotiable papers and their use; courts and their jurisdiction. The development of co-operation and co-operative societies, methods of organization and of operation of agricultural co-operative societies with a special study of their administration.

11. Farm Management, Accounting and Business Forms
Open to seniors First semester

A course of lectures combined with text book and practical work in the science of accounting and in kindred subjects, designed especially for students expecting to become farm managers, farm superintendents or farm management field men. Consideration is given to the various forms of commercial paper, the relation of credit institutions to the farm and to business methods in common practice. Emphasis is laid upon methods of cost keeping and the drawing up of yearly statements which show the real condition of the farm business.

12. Grain and Corn Judging Assistant Professor Bull and Mr. Arny
Three credits (four hours per week) Second semester
Open to seniors. Required of agronomy students.

A history and study in detail of representative samples of the leading varieties of grain, corn and grass seeds together with the adaptation of each to different localities; the conditions affecting the yield and market value; the uses to which grains and corn are put. Score card practice and comparative judging of grain, corn and grass seed is a prominent feature of this work.

AGRICULTURAL AND GENERAL CHEMISTRY

Ralph Hoagland, B. Agr., Professor of Agricultural Chemistry and Chief of Division
Rodney M. West, B.A., Instructor in Agricultural Chemistry
Cornelia Kennedy, B.A., Instructor in Agricultural Chemistry

1. Chemistry of Plant and Animal Life Mr. West
Three credits (two lectures, four laboratory hours per week) First and second semester
Open to sophomores. Courses 3 and 4 prerequisites.

Some of the topics studied are: the ash elements of plants and their function in plant nutrition, the nitrogenous and non-nitrogenous compounds of plants and animals, the chemistry of seeds and plant growth, the factors influencing the composition and value of crops and the composition and digestibility of foods. The chemical and allied changes which take place in the handling of milk and its manufacture into butter and cheese are also studied. Laboratory practice forms a prominent feature of the work.

2. DOMESTIC CHEMISTRY — MISS KENNEDY

Three credits (two lectures, four laboratory hours per week) First semester

Open to sophomores in home economics. Courses 3 and 4, prerequisites.

A study of human foods and their nutritive value and the chemical and allied changes which take place in the preparation of foods. Some of the subjects considered are: meats, vegetable foods, fruits, cereals, wheat flour, the chemistry of bread making, baking powders, condiments, tea, coffee, chocolate, the household water supply, dietary studies, the cost of foods and the rational feeding of man. Laboratory practice is given in testing the commercial value of foods and in the detection of adulterants.

3. GENERAL CHEMISTRY (Given in University Laboratories)

Three credits (two lectures, four laboratory hours per week) First semester

Open to freshmen.

Recitations, lectures and laboratory practice. Particular attention is given to the study of the elements and compounds which are of the most importance in agriculture. The laws governing the combination of the elements by weight and volume are illustrated by numerous problems. The writing of equations, chemical nomenclature, and the periodic system of classifying the elements are prominent features of the work. In the laboratory experiments are performed illustrating the general laws of chemistry which have a bearing upon agricultural chemistry.

4. QUALITATIVE ANALYSIS (Given in University Laboratories)

Three credits (six laboratory hours per week) Second semester

Open to freshmen. Course 3 prerequisite.

This course is arranged to meet the wants of agricultural students. The writing of equations and the study of principles involved in the separation of the various groups and individual compounds of elements are characteristic features of this work. It is the object of this course to familiarize the student with the processes employed in qualitative analysis, so that he may be able to determine the composition of all ordinary substances, particularly of those that are of the most importance in agriculture.

5. QUANTITIVE ANALYSIS — PROFESSOR HOAGLAND AND MR. WEST

Four credits (eight laboratory hours per week) First semester

Open to juniors. Courses 3 and 4 prerequisites. Elective.

An elementary course in quantitative analysis. The principles involved in gravimetric and volumetric analysis are studied. The work includes the gravimetric determination of iron, sulphur, phosphorus, magnesium, chlorine, acidimetry and alkalimetry, the volumetric determination of iron, calcium and the principles of iodimetry. The purpose of this course is to prepare the student for advanced agricultural and soil analysis.

6. THE CHEMISTRY OF FOODS — PROFESSOR HOAGLAND

Three credits (three hours per week) First semester

Open to juniors. Courses 3 and 4 prerequisites. Elective.

Lectures. An advanced course treating of the composition, digestibility and nutritive value of human foods. The processes employed in the preparation of foods, as the milling of wheat and other cereals, the economic uses of human and animal foods, the comparative value of foods, and the chemical methods employed in human nutrition investigations, particularly in proteid and carbohydrate metabolism, and the losses of energy from the body are studied. Dietary studies, including the cost of nutrients, and influence of different methods of preparation upon their nutritive value, are also included in the work. It is the object of this course to familiarize the student with the fundamental principles of nutrition and the use of literature upon the subject.

7. Anaylsis of Foods — Mr. West and Miss Kennedy
Three credits (six laboratory hours per week) — Second semester
Open to juniors, courses 3, 4 and 5 prerequisites. Elective.

This work includes the determinations of water, ash, starch, sugar, cellulose, fats, proteids and different forms of nitrogen in food stuffs, the use of the calorimeter and polariscope in food analysis. Before completing the course each student makes a complete proximate analysis of some food stuff. This course is planned to meet the wants of those who wish to become familiar with methods used in food analysis and nutrition investigation.

9. Organic Chemistry (Given in University Laboratories)
Nine credits (eighteen hours per week) — Second semester
Open to juniors, courses 3 and 4 prerequisites.

Lectures and laboratory work. The course includes the aliphatic series with a preparation of the more important compounds, supplemented by Levy's Anleitung fur Darstellung Organischer Preparate. Also the aromatic series with preparation of some of the more important compounds supplemented by Fischer's Organischer Preparate.

10. Chemistry of Wheat and its Milled Products — Professor Hoagland and Miss Kennedy
Three credits (six laboratory hours per week) — First semester
Open to seniors. Courses 3, 4, 5 and 7, prerequisites. Elective.

This course is designed to meet the needs of those who wish to become familiar with chemistry of the milling industry. It includes the determination of water, protein, ash, starch, sugar, gliadin and glutenin, fiber in wheat flour and mill feeds. Special attention is paid to the composition of wheat as affecting the quality of flour for bread making. Provision will be made for conducting milling tests with wheat, and baking and other physical tests with flour.

11. Advanced Agricultural Analysis — Professor Hoagland
Three credits (six laboratory hours) — Second semester
Open to seniors. Elective. Courses 3, 4, 5 and 7, prerequisites.

This course offers an opportunity for those who wish to pursue work along some special line in agricultural or food chemistry. Work such as digestion experiments, analysis of dairy products, composition of crops at different stages of growth, etc., may be taken if desired. Students desiring to take this course should arrange for it before the close of the juinor year so that material may be obtained for the work.

AGRICULTURAL ENGINEERING

John T. Stewart, C.E., Professor of Agricultural Engineering and Chief of Division
A. M. Bull, Instructor in Mechanical Drawing
H. B. White, B.S.Agr., Instructor in Carpentry
J. M. Drew, Instructor in Blacksmithing
H. B. Roe, B.S., Instructor in Mathematics
J. L. Mowry, Instructor in Mechanics
Thos. Sewall, Assistant in Drawing
A. D. Johnston, Assistant in Blacksmithing

1. UNIVERSITY ALGEBRA (Part II Higher Algebra) MR. ROE
Three credits (three hours per week) First semester

Elective. Open to all who have had Part I Higher Algebra as given in the Secondary Schools. Text, Downey, Part II, Chapters VI to XXIV inclusive, except portions of Chapter XXIII. Especial attention given to forms and uses of equations and Interpretations of their roots, theory of functions, development and analysis of series, and the theory, Method of calculation and practical value of logarithms. All are advised to take this course before taking up the subject of trigonometry.

2. PLANE TRIGONOMETRY MR. ROE
Three credits (three hours per week) Second semester

Open to those who have completed the algebra and plane geometry of the intermediate year of the School of Agriculture, or equivalent work of approved high schools.

The course includes a short, systematic review of the essentials of elementary algebra and plane geometry, in which all students must show proficiency, the thorough study of the theory and use of logarithms and of the functions of plane trigonometry, with numerous practical applications. No student who has not completed the subjects of higher algebra and plane geometry, as given in accredited high schools, will be admitted to the course.

3. PLANE AND SPHERICAL TRIGONOMETRY MR. ROE
Three credits (three hours per week) Second semester

Open to all who have completed course 1. Elective.

Properties of plane triangles and their solution by means of logarithms; general properties and solutions of the spherical triangles; with numerous practical applications in both the plane and the spherical sections.

Students in Forestry are advised to take this course.

4. MECHANICAL DRAWING MR. BULL
Three credits (six hours per week) Either semester

This course includes lectures on drawing, preliminary exercises in the use of drawing instruments, lettering, water coloring, the making of working drawings from models and the practical value of drawing in arranging buildings, machinery, household equipment, etc.

5. CARPENTRY MR. WHITE
Three credits (six hours per week) Elective First semester

Instruction is given by means of lectures on the care and use of the common carpenter tools, such as should be found on every farm; also on methods of farm building construction, framing, laying out rafters, stairways, estimating building materials, painting, etc. In the carpenter shop students are required to make mortise joints, splices, drawing boards, hammer handles, eveners, cupboards, etc. Each student is required to file his own saws, sharpen his planes, chisels, etc., and to lay out rafters for buildings.

6. BLACKSMITHING MR. DREW
Three credits (six hours per week) Elective Second semester

The students are instructed in the management of the forge and fire, and in bending, shaping and welding iron and steel. Particular attention is given to rapid and accurate welding and to the sharpening and tempering of steel tools.

7. FOREST MECHANICS MR. DREW AND MR. WHITE
Three credits (nine hours per week) February 1 to April 15

Open to juniors in Forestry.

(a) Blacksmithing: Instruction and practice work in the handling of forge and anvil, the bending, shaping and welding of iron and steel, the tempering of steel tools, the grinding and care of the axe and similar work.

(b) Carpentry: Practice work in the use and care of tools used in lumbering, saw filing, etc.

8. Farm Structures — Mr. Mowry and Mr. White

Three credits six hours per week). A first semester elective to all who have completed mechanical drawing. Lectures and practice work covering the laying out of plans for farm buildings. The questions of location, size, convenience, methods of construction, materials, heating systems, water systems, ventilation, sewage disposal, painting, durability, cost, etc., are discussed.

9. Farm Structures — Mr. Bull

Three credits (six hours per week) — Second semester

Elective to all who have completed course 8.

Each student selects an imaginary or real farm and makes drawings, showing location of buildings, drives, yards, fences, etc., paying particular attention to locating each building and properly planning them so as to best meet the requirements of each individual farm and the means at hand for erecting them. Specifications and estimates of cost of buildings are also made.

10. Household Mechanics — Mr. Bull, Mr. White and Mr. Mowry

Two credits (four hours per week) — First semester

Open to seniors in home economics who have completed course 4. Lectures and practice work in drawing. Location of farm buildings, drives, yards, etc., architectural designing, the study of plans, fittings and equipment; heating systems, ventilation, floors and wood work, painting and decoration. Each student is required to lay out plans for an imaginary or real house, paying particular attention to location.

11. Agricultural Physics — Professor Stewart and Mr. Mowry

Three credits (six hours per week) — Second semester

Open to sophomores.

This work is carried on by lectures, class demonstrations, reference work, discussions and note book records. Among the subjects treated are: method of keeping original records, molecular nature of matter, the laws of specific gravity, heat, evaporation, water pressure, explosives and their use on the farm, the physical properties and manufacture of cement, drain tile and sewer pipe. Temperature, rainfall, runoff and their effect on agricultural production. Soils as related to roads and drainage. Lectures and laboratory practice work on steam and gasoline engines, wells, pumps, pipe fitting, soldering, belt lacing, properties and strength of wood, steel and cement.

12. Farm Engineering — Professor Stewart

Three credits (six hours per week) — Second semester

Open to juniors and seniors who have had Agricultural Physics. Methods of making U. S. land surveys, and the principles of resurveying, the improvement of farm lands by open ditches, under drainage, levees, outflow culverts, and pumps. A brief summary of irrigation methods in the arid, semi-arid and humid regions; roads and road construction in agricultural districts. Methods and cost of farm fencing, practical work in mensuration, and elementary surveying.

13. Forest Engineering — Professor Stewart

Three credits (six hours per week) — Second semester

Open to sophomores who have had trigonometry, and have a knowledge of the principles of mechanical drawing and lettering. Should have had not less than one semester in mechanical drawing.

Method of making the original land surveys, and the principles of retracing lines and relocating corners, method of representing and arranging field data on plats, a study of topographic symbols and the elements of topographic drawing, including tracing, and blue printing, lectures and demonstration on man, horse and canoe packing, camp equipment and camp discipline.

14. **Forest Engineering** Professor Stewart

Three credits (one hundred and eighty hours) (In Itasca Park)

Open to those who have completed the above course in forest engineering.

Field practice in mensuration, surveying, pacing, and rapid methods of field topography, use of transit, level, and plane table, preparing report of field work which will include finished plats, and maps of survey notes.

Note: Students taking any of the above courses must provide themselves with the necessary drafting instruments, regulation note books, drawing paper, etc.

At the beginning of the courses in agricultural and forestry engineering there will be some duplication of lecture work. A student taking both courses will be given extra work in lieu of that which is duplicated in the other course.

ANIMAL HUSBANDRY

Andrew Boss, Professor of Animal Husbandry and Chief of Division
D. A. Gaumnitz, M.S.Agr., Assistant Professor of Animal Husbandry
W. F. Handschin, Instructor in Animal Husbandry
J. L. Edmonds, B.S.Agr., Instructor in Animal Husbandry
J. M. Drew, Instructor in Poultry

1. **Live Stock Husbandry** Mr. Edmonds

Three credits (three hours per week) First semester

The market classes of horses, cattle, sheep and swine are taken up briefly to bring out the form, quality, and condition desirable and common to the different classes. This is followed in each class of stock with most common and valuable breeds for the state. These are studied carefully as regards their origin and characteristics, and as to their adaptability to the different Minnesota conditions. This work is illustrated with stock from herds and flocks maintained at the University Farm for this purpose. Work in stock judging is combined with studies of the breeds and types. A short period of time is given to the consideration of live stock management including instruction in the best practices in breeding and feeding.

2. **Poultry** Mr. Drew

Three credits (three hours per week) First semester

Open to seniors.

The instruction in this subject will include the following topics: history and characteristics of the leading breeds of poultry; breeding, rearing and management of fowls for eggs and for the market; planning, building and arrangement of poultry houses; managing incubators and brooders. A model poultry house, containing pens of the most improved breeds, incubator cellar, work-room, etc., has been provided, where experimental work and practical instruction are carried on.

3. **Meats** Assistant Professor Gaumnitz

One credit (one hour per week) First semester

Open to juniors in home economics.

The instruction given to the students in home economics in the subject of meats as it pertains to the selection and value of different classes of meats and to the best methods of curing and preserving.

4 STOCK JUDGING — ASSISTANT PROFESSOR GAUMNITZ
Three credits (six hours per week) — First semester
Open to sophomores or juniors.

This course is calculated to meet the needs of students desiring to become expert stock judges and of those who wish to study animal form with a view of becoming breeders of superior animals.

Score card work in combination with the presence of living specimens is a feature of this course. Students are drilled in judging from the standpoint of breed, type, form, stamina, quality, breeding capacity, suitability for feeding and for general and specific production.

5. STOCK JUDGING — PROFESSOR BOSS AND ASSISTANT PROFESSOR GAUMNITZ
Three credits (six hours per week) — First semester
Open to seniors.

An advanced course consisting of practice in judging market classes of fat stock and special work with breeding stock. Trips of inspection to neighboring stock farms will be made and work given in county fair judging where suitable arrangements can be made.

6. ANIMAL BREEDING — PROFESSOR BOSS
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed zoology.

A study of the physiology of the reproductive organs of animals and of the processes of reproduction; the causes and forms of variation; the laws of transmission and heredity; the application of these principles to the practical methods of breeding; a review of the practices of breeders famous for the improvement of live stock; outlines of methods for individual breeding operations, and for co-operative operations including plans for a community co-operative breeding project.

7. LIVE STOCK FEEDING AND MANAGEMENT — ASSISTANT PROFESSOR GAUMNITZ
Three credits (three hours per week) — Second semester
Open to juniors.

The principles of feeding as applied to economical production; feeding rations, feed stuffs, methods of feeding, care and management of breeding and fattening stock, management of animals during pasture, yard and stall feeding for the block, and stable management suitable for the various classes of live stock. The work is based on the investigations of the experiment stations, and a careful review of station bulletins and publications will be made.

9. NUTRITION RESEARCH — PROFESSOR BOSS AND ASSISTANT PROFESSOR GAUMNITZ
One and one-half credits (three hours per week) — First half second semester
For outline of work see course (4) Animal Nutrition.

10. MEATS — ASSISTANT PROFESSOR GAUMNITZ
Three credits (three hours per week) — First semester
Open to seniors.

A continuation of studies in meats as outlined in the school course. Supplemented by dissection and studies of muscular structure of various kinds of meat.

This course is designed especially for studying meat making animals and their products. Under general guidance each student makes up rings of animals which he studies in detail, at every step from the live state until the different parts are cooked and tested at the table. Full records and conclusions, as well as illustrations are required in thesis form.

11. Live Stock Records and Research — Assistant Professor Gaumnitz
Three credits (six hours per week) — Second semester
Open to seniors. Elective.

This course will consist of reviewing literature upon different phases of stock production. The Experiment Station records and other sources of information will be used largely. This together with original work will form the basis of extended compilation of material on live stock husbandry, and a thorough study of systems of keeping and compiling stock records upon stock farms and at experiment stations. Sufficient actual practice will be required to become familiar with live stock records and herd books.

12. Animal By-Products — Assistant Professor Gaumnitz
Three credits (three hours per week) — Second semester
Open to seniors.

Individual study of the by-products manufactured at the large parking houses will be required of each student. The value and place that each has in economic use is considered.

13. Advanced Meats and Judging — Assistant Professor Gaumnitz
Three credits (six hours per week) — Second semester
Open to juniors and seniors. Elective.

Work along this line is a continuation of that begun in course 12. More attention is given the more important details concerning meat, and a minute study of its physical and chemical composition is required.

14. Animal Mechanics — Professor Reynolds and Assistant Professor Gaumnitz
Three credits (three hours per week)
Open to seniors.

A study of the mechanical effects of different relationships of bone and muscle in the animal body. This applies particularly to horses. The entire feet and legs as well as the body will be studied and made clear by apparatus and original illustrations.

15. Live Stock Practicums — Mr. Edmonds
Two credits (four hours per week) — Second semester

Feeding and stable management of cattle, horses, sheep and swine; recording and calculating amounts of pasturage obtained from different forage crops, keeping herd records, writing pedigrees and recording animals, calculating feeding records and cost of production, mechanical analysis of carcasses of animals to determine total amount of meat and proportionate amounts of fat and lean, determinations of fat and lean meat with specially designed apparatus; calculating percentage of different parts of the carcass.

ANIMAL NUTRITION

T. L. Haecker, Professor of Animal Nutrition and Chief of Division
Andrew Boss, Professor of Animal Husbandry
M. H. Reynolds, B.S., M.D., D.V.M., Professor of Veterinary Medicine and Surgery
D. A. Gaumnitz, M.S.Agr., Assistant Professor of Animal Husbandry
C. C. Lipp, D.V.M., Assistant Professor of Veterinary Medicine and Surgery

1. PRINCIPLES OF ANIMAL NUTRITION — PROFESSOR HAECKER
Three credits (three hours per week) — First semester
Open to juniors.

Lectures and class room work. The principles of animal nutrition, their relation to the economic production of animal and animal products, and the relation of the constituents in nutriment consumed to amount and character of products produced, form the basis of this course. Accompanying this course there will be assignments carrying out some phase of animal production or the production of some animal product, tracing the disposition made of the nutrients in the feed. Practice work is given in formulating and compounding rations, in the study of comparative value of food stuffs and other problems relating to feeding.

2. NUTRITION RESEARCH — PROFESSOR HAECKER
Three credits (three hours per week) — First semester
Open to seniors.

Seminar and laboratory work in the study of animal nutrition problems. This course is open to advanced students and is offered during the first semester. The student is required to become familiar with the literature of some phase of animal nutrition, outline and conduct an investigation under the supervision of the instructors of the department, and prepare a suitable report of the investigation. For carrying out this work animals will be provided for feeding operations and laboratory facilities afforded for analytical work. The object of this course is to familiarize the student with the methods employed in the study of animal nutrition problems.

3. STATISTICS OF NUTRITION — PROFESSOR HAECKER AND ASSISTANTS
Three hours. — Second semester
Open to seniors. Elective.

This includes a thorough study of experiments made on income and expenditure of matter and the income and expenditure of energy, the relation of food consumed to kinds and character of energy expended.

4. NUTRITION RESEARCH — PROFESSOR HAECKER AND ASSISTANT PROFESSOR GAUMNITZ
One and one-half credits (three hours per week) — First half second semester
Open to seniors.

This course is open to advanced students and is offered during the first half of the second semester. The student is required to become familiar with the literature of some phase of animal production, outline and conduct an investigation under the supervision of the instructors of the department, and prepare a suitable report of the investigation. For carrying out this sort of work animals will be provided for slaughter tests. The object of this course is to familiarize the student with the methods employed in the study of problems relating to animal production.

5. PHYSIOLOGY OF NUTRITION 1911–12. — ASSISTANT PROFESSOR LIPP
One and one-half credits (three hours per week) — Last half second semester
Open to seniors.

This is an advanced study of the veterinary physiology of digestion, taking up the digestive fluids, nervous mechanism of digestion, absorption and digestion of grains and fodders. It also includes a study of body nutrition, body income and expenditures, source of heat supply and heat loss, and metabolism. Veterinary Physiology, by F. Smith, is used as a text and guide for this work, but students are required to do collateral reading.

6. DAIRY STOCK FEEDING (Dairy Husbandry 8) — PROFESSOR HAECKER
Three credits (three hours per week) — First semester

Open to seniors.

Lectures on the characteristics, composition and nutrition value of feed stuffs; the economical production of dairy stock and dairy products. A study of the production value of feeds or the relation of feeds to products. Practice work in formulating rations.

BOTANY

FREDERICK E. CLEMENTS, Ph.D., Professor of Botany
JOSEPHINE E. TILDEN, M.S., Assistant Professor of Botany
CARL O. ROSENDAHL, Ph.D., Assistant Professor of Botany
N. L. HUFF, M.A., Instructor in Botany
FREDERICK K. BUTTERS, B.A., Instructor in Botany
ALICE M. MISZ, M.A., Assistant in Botany

1. GENERAL BOTANY PROFESSOR CLEMENTS, ASSISTANT PROFESSOR ROSENDAHL, MESSRS. HUFF, BUTTERS AND MISS MISZ

Six credits (six hours per week) First and second semesters

Open to freshmen.

Greenhouse study of the behavior and structure of flowering plants, following the life cycle from germination to seed production; laboratory study of the evolution of the plant kingdom and the underlying principles of plant life; laboratory and greenhouse work in the indentification and relationship of flowering plants, together with field work on the plants of forest and grassland; practical papers on selected topics, viz., bacteria, plant growth, evolution, etc.

2. ADVANCED BOTANY PROFESSORS CLEMENTS, ASSISTANT PROFESSOR ROSENDAHL

Six credits (six hours per week) First and second semesters

Open to sophomores.

Systematic work in the naming and classification of plants, chiefly of the groups of economic importance, i. e., flowering plants, fungi and algae, with emphasis on the common plants of Minnesota; ecological study in the greenhouse of the structure and meaning of the adaptations of root, stem and leaf, and in the field of the principles of plant distribution, migration and grouping; cytological study of growth, production of pollen and egg-cells, fertilization, hybridization, and seed formation; one practical paper each semester, cytology of plant breeding and the botany of a group of economic plants for horticultural students; plant adaptations and the life history of a forest for forestry students.

3. PHYSIOLOGY AND ECOLOGY PROFESSOR CLEMENTS

Six credits (six hours per week) First and second semesters

Open to juniors.

Study of the factors which make the plant's home, viz., water, light, heat, soil, etc.; response of the plant to its home, absorption, transport, water-loss, food-making, storage, growth, fertilization, and reproduction; adaptation of plants to their various homes, and the origin of new forms by selection, adaptation, mutation, and hybridization; structure and development of vegetation, i. e., grouping, migration, competition, acclimatization, invasion, succession, zonation, etc., of plants; one practical paper each semester on selected topics, e. g., acclimatization, adaptation, origin of new forms, vegetation of Minnesota, of North America, etc.

4. ALGAE ASSISTANT PROFESSOR TILDEN

Six credits (six hours per week) Both semesters

Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

A detailed comparative study of the structure and classification of the algae; the blue-green and the yellow-green algae together with a systematic examination of forms in the Minneapolis water supply, occupy the first semester, and the brown and the red marine algae the second semester. Lectures, laboratory and reference work.

5. Fungi — Professor Clements
Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

The classification and life-history of the various groups of fungi, based on identification, cultures and field work, with particular reference to forms which cause plant and animal diseases. Lectures and discussions, laboratory, greenhouse and field work.

6. Mosses and Ferns — Assistant Professor Rosendhal and Mr. Huff
Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

The course is designed for students who wish to pay special attention to the morphology and taxonomy of liverworts, mosses and ferns. Lectures, laboratory and field work.

7. Flowering Plants — Assistant Professor Rosendahl
Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

The course is designed to afford the student an opportunity to become proficient in the determination of plant species and plant types, as well as to show the genetic development and relationships of the flowering plants. Lectures, reference reading, laboratory, greenhouse and herbarium work, together with field work in the fall and spring.

8. Ecology — Professor Clements
Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1, 2 and 3; the laboratory fee is three dollars per semester.

A critical study of plant habitats by means of instruments, and the adaptations produced by water and by light, together with a careful examination of the causes and reactions of plant formations. Class discussions and quizzes, field and greenhouse work.

9. Plant Physiology — Professor Clements
Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1, 2 and 3; the laboratory fee is three dollars per semester; alternates with course 8.

A study of the relations of factor, function and structure in the various organs of the plant, with special reference to absorption, transpiration, photosynthesis, respiration, irritability, and reproduction. Class discussions and quizzes, greenhouse and field work.

11. Industrial Botany — Assistant Professor Tilden
Six credits (six hours per week) — Both semesters

Open to technical students who have completed course 1 and to academic students who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

A study of the origin, distribution and cultivation of plants yielding products of economic value, the nature and use of these products, and the processes by which they are obtained from the plants. Lectures, demonstrations, topics and laboratory work.

12. Plant Foodstuffs and Textiles — Miss Tilden

Three credits (six hours per week) — One or both temesters

Open to technical students who have completed course 1, and to academic students who have completed courses 1 and 2.

A study of the botany of foods, textiles and fabrics, with reference to their source, structure, preparation, adulteration, etc., together with an inquiry into the relations of plants to household processes and problems. Lectures, demonstrations, topics and laboratory work.

DAIRY HUSBANDRY

T. L. Haecker, Professor of Dairy Husbandry and Chief of Division
Edw. K. Slater, Assistant Professor of Dairy Husbandry
G. P. Grout, M.S., Instructor in Dairy Husbandry and Bacteriology

1. Dairy Stock Judging — Mr. Grout

Three credits (three hours per week) — First semester

Open to seniors.

The gross anatomy of the dairy cow is studied, showing the relation of form to function. Complete life record of many cows is at the students' disposal, giving not only the total yield of each cow, but their economic production as well, placing the work on a scientific basis. A brief history of the dairy breeds is given and practical drill in breed characteristics. Many pure bred herds in the vicinity of the Twin Cities are visited after laying a foundation by working on cows whose economic habits are known. The last six weeks of the semester are devoted to a systematic study of pedigrees.

2. Factory Management — Assistant Professor Slater

Three credits. — First semester

Open to seniors. Elective.

Includes a study of the organization of creamery associations essential for success in operating creameries, the construction and equipment of whole milk and hand separotor factories, and lectures on calculating dividends, sinking funds, percentage of yield, over-run, etc.

3. Factory Buttermaking — Mr. Grout

Three credits (six hours per week) — Second semester

Open to seniors.

Includes lectures on the composition of dairy products, separation of milk cream ripening, prepartaion of pure culture starter, pasteurization, churning and working, controlling moisture content of butter, preparing the butter for market' a study of market requirements, the examination and scoring of butter and cheese, and practical demonstrations in the college creamery.

4. Cheesemaking — ——————————

Three credits (Given during factory course Nov. 14—Dec. 10) First semester

Open to seniors.

Includes lectures and practical work in making common and fancy cheese as Brick, Swiss, Sage, Stilton, Pineapple and Gouda; also advanced work in the study of the importance of the quality and composition of the milk in manufacturing Cheddar cheese; the principles involved in cutting, heating, milling, salting and pressing the curd, curing and marketing cheese, and the construction and ventilation of factories and curing rooms.

5. Dairy Bacteriology — Mr. Grout
Three credits (six hours per week) — Second semester
Open to juniors and seniors. Research.
Required in the Dairy and elective in the other courses.

Instruction is given in the preparation of culture media and the cultivation of bacteria. During the semester a general study is made of bacteria, their function and activities, together with a study of the milk flora and of commercial cultures.

6. Dairy Farm Management — Professor Haecker and Mr. Grout
One and one-half credits (three hours per week) — Last half second semester
Open to juniors and seniors.

Lectures covering the fundamental principles of breeding for developing the highest efficiency in the mature animal. Forage crops will be considered and the arrangements of pasture and field for the most economical feeding of stock. One dairy barn plan will be required.

7. Dairy Bacteriology — Mr. Grout
One and one-half credits (three hours per week) — First half second semester
Open to juniors and seniors.

Lectures on the morphology, classification, physiology and cultivation of bacteria; their relation to sanitary milk production and to scientific dairying.

8. Dairy Stock Feeding — Professor Haecker
Three credits (three hours per week) — First semester
Open to juniors and seniors.

Lectures on the characteristics, composition and nutritive value of feed stuffs; economical production of dairy stock and dairy products. A study of the production value of feeds, or the relation of feed products. Practice work in formulating rations.

9. General Bacteriology — Mr. Grout
Three credits (six hours per week) — First semester
Open to freshmen. Elective.

Text, lecture and laboratory work covering the subject in a general way. Intended to train the student in laboratory methods for investigation along special lines offered later in the college course. Text Muir and Ritchie.

10. Dairy Husbandry — Professor Haecker and Assistants
Three credits (six hours per week) — Second semester

Lectures giving instruction in the care of milk, the running of farm separators, and the manufacture of butter. Lectures on the characteristics of the different dairy breeds and points desirable in animals intended for the dairy; the relation of form to production being the basis of instruction in dairy stock selection. Lectures are also given covering the practical phases of feeding. Along with these lectures, practice work is given in cream ripening, churning, working and packing butter, in the use of cream separators, and in milk testing.

11. Dairy Husbandry — Mr. Grout
Three credits (three hours per week) — Second semester

Open to seniors.

An advanced course in dairy stock judging intended for those specializing in dairy work. This work is given on Mondays and the entire day is left open to visit nearby herds.

DOMESTIC ART

Margaret J. Blair
Mary L. Matthews, Assistant
Avis C. Hall, Assistant

1. Elementary Sewing — Mrs. Blair
Three credits (six hours per week) — First semester
Open to freshmen.

Instruction is given in hand sewing, including the different stitches, hems' seams, gussets, plackets, fastenings and the various kinds of darning and patching, taking up the practical application of each in designing, drafting, cutting and making of underwear. The drafting is taught by a simple method in which only a tape line and square are used. Talks are given on the use and care of the work basket, touching upon the history of its implements, and upon the textiles, cotton, wool, silk and linen, also the selection of suitable materials and the care of the underwear.

2. Designing and Drafting — Mrs. Blair
Three credits (six hours per week) — Second temester
Open to freshmen.

Each student is given instruction in designing, drafting, fitting and finishing a shirt waist suit and thin gown. Lectures are given upon proper dress, its style, neatness and suitability to the wearer also a color study from nature in reference to harmony of color in dress.

3. Textiles — Mrs. Blair
Three credits (three hours per week) — Second semester
Open to juniors.

This course includes the study of cotton, linen, flax and wool, and the manufacture of the different materials. The student is required to make a notebook containing samples of each material as it is studied.

4. Advanced Designing and Drafting — Mrs. Blair
Three credits (six hours per week) — Second semester
Open to sophomores.

A course designed to teach the drafting of skirt patterns and the fitting and making of drop skirt and tailored dress skirt. Lectures are given and research work required along the line of history of dress. If possible there is to be given instruction in millinery suitable for home use.

5. Practice Teaching — Mrs. Blair
Four credits (four hours per week) — Both semesters
Open to juniors and seniors. Elective.

Each student is required to do one semester's work in teaching under the supervision of the teachers in the School of Agriculture or in one of the Mission Schools or private schools of the two cities. Some lecture work as well as laboratory work is required. Preparation of materials for classes is part of the course.

6. HOUSEHOLD ART — MRS. BLAIR

Three credits (three hours per week) — First semester

Open to seniors.

Lectures upon house and grounds, noting the distinctive character of the country home; the sanitary conditions involved in the selection of the site of the house; the influence of the outlook; an elementary study of architecture in connection with planning a house; instruction in the fundamental value of color, form and design; training the taste and emphasizing the laws of hygiene that should influence the selection of materials and styles in the finishing and furnishing of the house. At the end of the term a book, containing an original house plan with furnishing schemes and color selections, is prepared by each student.

7. HANDICRAFT — MRS. BLAIR

Three credits (six hours per week) — Second semester

Open to seniors.

Pottery, basketry, leather work, weaving, crocheting and knitting are taken up in this course and studied in their simpler forms.

DOMESTIC ECONOMICS

FANNIE C. BOUTELLE
MARTHA B. MOORHEAD, M.D., Lecturer in Domestic Hygiene

1. THE FAMILY — MRS. BOUTELLE

Three credits (three hours per week) — Second semester

Open to freshmen.

History of the family as an institution. The economic functions of the family with regard to industry, prosperity, education and population. The psychology of family life. Lectures, problems and recitations.

2. THE HOME — MRS. BOUTELLE

Three credits (three hours per week) — First semester

Open to sophomores.

The evolution of the modern home from primitive conditions. Evolutions of the social, industrial, religious and economic conditions in the home, and their relation to civic life. Influence of the standard of living. Administration, organization and maintenance of the home. Lectures, problems and recitations.

3. DOMESTIC SERVICE — MRS. BOUTELLE

Three credits (three hours per week) — Second semester

Open to juniors.

History of domestic service in America. Economic phases of domestic service. Disadvantages of domestic service, from the standpoint of both employer and employee. Doubtful remidies for present conditions. General principles of possible remedies. Lectures, problems and recitations.

4. LEGAL AND ECONOMIC POSITION OF WOMAN — MRS. BOUTELLE

Three credits (three hours per week) — First semester

Open to seniors.

Women as wage earners and the effect from an economic standpoint. Co-operation, with special reference to woman's work. Investments, Lectures, problems and recitations.

5. DOMESTIC HYGIENE — DR. MOORHEAD

One credit (one hour per week)

The care of the sick, accidents and emergencies, infectious diseases, especially the contagious diseases of childhood—typhoid fever and tuberculosis; causes, means of transmission, methods of prevention. Personal hygiene, hygiene of infancy maidenhood and maternity.

DOMESTIC SCIENCE

JUNIATA L. SHEPPERD, M.A.
MARY L. BULL, Assistant
MAY MCDONALD, B.S., ASSISTANT

1. ELEMENTARY DOMESTIC SCIENCE — MISS SHEPPERD

Three credits (six hours per week) — First semester

Open to freshmen.

Fuels: Composition, source and available power for household use are considered together with various appliances used in the culinary art.

Cooking: The composition, digestibility, food and money value of vegetables, cereals, breads, etc., are carefully studied, and possible losses in preparing and cooking are elaborated by the use of suitable laboratory exercises. The cooking of vegetables, cereals, breads, etc., are special topics considered. Research work is directed largely toward acquiring reliable data regarding the composition, digestibility, comparative food and money values of such materials as are used in the laboratory practice.

Laundering: During the semester the principles of laundering are taken up; removing stains, dyeing, bleaching, etc., as well as the right use of chemicals and machinery in the laundry. The comparative values of starches and bluings are studied. The use of hand and commercial laundry machinery is taught by means of demonstration, observation and reading. Text books, lectures, assigned readings and recitations.

2. DOMESTIC SCIENCE — MISS SHEPPERD

Three credits (six hours per week) — Second semester

Open to freshmen who have completed course 1.

During the year special attention is given to fruit dishes, the preservation of fruit by means of canning, preserving, pickling, jelly making, etc., followed by such other work as conditions and prices of materials warrant.

Laboratory: Bread making, yeast breads, etc. Lectures, library research, practice and classroom discussions.

3. DOMESTIC SCIENCE — MISS SHEPPERD

Three credits (six hours per week) — First semester

Open to sophomores.

A study of various foods, their food value, manufacture, etc. Study of dietaries. Laboratory practice.

4. METHODS IN DOMESTIC SCIENCE — MISS SHEPPERD

Two credits (six hours per week) — Second semester

Open to juniors.

The object of this course is to acquaint the student with approved methods of conducting laboratory work that they may acquire ability to teach successfully under varied conditions; to give such efficiency as will insure pupils working rapidly harmoniously and successfully from the first. A certain amount of practice teaching is required during this year. This work is carried on in connection with the school classes and students should so arrange their programs as to leave time for this Syllabi of certain topics, as water, air, etc.; and laboratory practice. Lessons in judging prepared foods, such as baked products, preserved goods, etc., are given.

5. Domestic Science — Miss Shepperd
One credit (two hours per week) — First semester
Open to juniors. Given in connection with Household Mechanics.

Instruction consists of discussions in regard to the conditions necessary to healthfulness; the general application of sanitary principles in regard to food, air and water; care of plumbing, heating, lighting and ventilating apparatus; disposal of kitchen waste, cremation, earth burial, etc. This follows Household Mechanics in order that the students may be able to gain a more comprehensive view of the subject of ventilation, heating, etc., because of knowing something of materials of construction from the architect's standpoint.

6. Domestic Science and Practice Teaching — Miss Shepperd
Three credits (six hours per week) — Second semester
Open to seniors.

The dining room in its different phases of equipment, care, etc., labor saving devices and the possible application of business methods in housekeeping receive due consideration. Preparing and serving with limited means is required. Independent teaching with as much practice as possible in selecting food materials at the market. An itemized account of kind and amount of material used, number of students present, cost of lessons, etc. The practice school on the South-east Campus gives ample opportunity for such work. Class room discussions, laboratory practice, fancy cookery, serving, etc. This is the culmination of the students' school work, and each is expected to show her ability to use knowledge by preparing floor plans showing equipment, with details of construction and tentative cost of a laboratory kitchen, as well as to make lesson outlines, practice their use and revise and perfect them as far as possible.

7. Domestic Science, Nursing and Dietetics — Dr. Richard Baird
Open to juniors and seniors. Elective. — Second semester

The University Training School for Nurses, is, primarily, a school for nurses; but arrangements have been made whereby seniors in home economics will be permitted to take advantage of the lectures, which will cover elementary nursing, dietetics, emergency work, etc. Due credit will be allowed for all work taken.

DRAWING AND DESIGNING

Freehand

Henrietta Clopath, Instructor in Freehand Drawing and Designing

1. Freehand Drawing — Miss Clopath
One credit (four hours per week) — One-half second semester

Study of proportion and form, including drawing from plants and from objects. The study of perspective in rectangular and cylindrical objects. Out-of-door architecture and interior drawing.

2. Designing — Miss Clopath
Four credits (four hours per week) Elective — Both semesters

History of the principles of designing with exercises, using alphabet, animal and plant motives. Adaptation of these designs to articles of household use. The theory of color with exercises in hue, value and intensity in relation to color harmony. Exercises in lettering.

3. Advanced Designing — Miss Clopath
Four credits (four hours per week) — Both semesters
Course 2 prerequisite. Elective.
Advanced work along same lines as course 2.

ECONOMICS

John Henry Gray, Ph.D.
Samuel B. Green, B.S.
Edward V. Robinson, Ph.D.
Raymond V. Phelan, Ph.D.
John L. Coulter, M.A.
T. P. Cooper, B.S.Agr.

1. Elements of Economics — Professor Robinson, Dr. Phelan and Mr. Coulter
Three credits (three hours per week) — Repeated each semester

Open to sophomores, juniors and seniors; designed for those who desire a general knowledge of economics and as an intruduction to the more advanced courses offered in the department.

1a. Forest Economics and Forest Law — Professor Green
Three credits (three hours per week) — First semester
Open to juniors. Course 1 prerequisite.

The development of forestry in the United States and foreign countries, the forest conditions here and abroad and their effect upon the lumber industry; forest policies of different governments. Lectures, collateral reading and reports.

1b. Agricultural Economics — Mr. Cooper
Three credits (three hours per week) — Second semester
Open to juniors. Course 1 prerequisite.

The development of agriculture; problems of rural life. Agricultural organization and methods. Agricultural finance and a special study of the various economic movements affecting agriculture.

1c. Agricultural Economics — Mr. Cooper
Three credits (three hours per week) — First semester
Open to seniors. Course 1b prerequisite.

Development of agricultural laws as applied to drainage, water rights, irrigation, land contracts and leases. The fundamental features underlying contracts; laws governing negotiable papers and their uses; courts and their jurisdiction. The development of co-operation and co-operative societies, methods of organization and of operation of agricultural co-operative societies with a special study of their administration.

2. Economic Geography — Professor Robinson
Three credits (three hours per week) — First semester
Open to sophomores, juniors and seniors.

A study of the economic basis of modern civilization. The course embraces (1) a brief survey of the history of commerce prior to the modern period; (2) an analysis of the causes, both in nature and man, which control the development and the localization of industry and commerce; (3) a summary view of the development of transportation in relation to commerce; (4) some mention of the principal materials of commerce; and (5) a more detailed consideration of the natural resources, chief industries, commercial products, and commercial relations of the leading countries. Special attention is given to the United States and to international trade routes, both by land and sea. Text book, supplemented by lectures, reports on special topics, and quiz.

3. MODERN INDUSTRIAL AND COMMERCIAL HISTORY — PROFESSOR GRAY
Three credits (three hours per week) — Both semesters

Open to sophomores, juniors and seniors; may be taken in conjunction with course 1 or course 2; both semesters must be completed before credit is given for the first semester.

The industrial and commercial history of western Europe and America since the middle of the eighteenth century. The effects of modern inventions and political changes on industry and trade. Lectures with prescribed topical readings. One written report of considerable length will be required each semester.

4. ADVANCED ECONOMICS — PROFESSOR GRAY
Three credits (three hours per week) — Second semester

Open to those who have completed course 1; required for a major in economics.

An advanced course in general economics, devoted largely to a study of recent theories of distribution. Assigned readings, reports and discussions.

5. MONEY AND BANKING — DR. PHELAN
Three credits (three hours per week) — Repeated each semester

Open to those who have completed course 1.

The history and theory of money; nature and uses of credit; functions of banks, trust companies and other financial institutions; foreign exchange and the settlement of international balances. Lectures, text-book, assigned readings and discussions.

6. PUBLIC FINANCE — PROFESSOR ROBINSON
Three credits (three hours per week) — First semester

Open to those who have completed course 1.

The development of the state as an economic organism. Public expenditures from the viewpoint of public wants. Budget system of the leading countries, with special emphasis on the United States. Public revenues from public domains and industries. Principles, incidence and administration of taxation. The theory of public debts. Text-books, supplemented by lectures and assigned readings.

7. PROBLEMS IN TAXATION — PROFESSOR ROBINSON
Three credits (three hours per week) — Second semester

Open to those who have completed course 6.

Study of tax systems, tax reforms, and special forms of taxation, such as the mortgage, corporation, and inheritance taxes. Based on Seligman, Essays in Taxation, and reports of state tax commissions with lectures and reports on special topics.

8. ECONOMICS OF TRANSPORTATION AND COMMUNICATION — PROFESSOR ROBINSON
Three credits (three hours per week) — Second semester

Open to those who have completed course 1 and to students in the technical colleges.

A general course on the history and theory of transportation and communication, with special reference to the United States; early routes and methods of migration and commerce; causes determining the location of railways; effect of steam and electricity in the consolidation of industries and of nations; signal systems, the post, telegraph and telephone; parcel post and express service; economic functions and relations of highways.

22. MATERIALS OF COMMERCE — MR. COULTER
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 2.

A study of the principal wares of commerce with reference to sources, uses and industrial processes. Text-books with collateral reading, lectures and visits of inspection.

28. FINANCIAL HISTORY OF THE UNITED STATES — DR. PHELAN
Three credits (three hours per week) — Second semester
Open to those who have completed courses 1 and 5.

The main lines of our financial development, including our monetary and banking history, are traced by means of lectures. Readings in the literature of the subject and topics for investigation are assigned. Lectures, text-book, assigned readings, and discussions.

EDUCATION

Course 1 in philosophy and courses 1 and 2 in education are specified as necessary for the University Teacher's Certificate. One other three-hour course for a half year is required for this certificate, and is elective from the courses in education.

1. HISTORY OF EDUCATION TO THE REFORMATION — ASSISTANT PROFESSOR SWIFT
Three credits (three hours per week) — First semester
Open to juniors and seniors.

An introductory study in the history of education conducted by means of lectures, assigned readings, discussions and reports. The purpose of the course is to arouse an interest in educational problems, to secure some perspective for use in current investigations, with some command of the facts of educational history, and some ease in the methods of historical study. An attempt is made to bring out education as one phase of civilization and to show the connection of schools with other social institutions. Attention will be given especially to an examination of the schools of Greece and of Rome, the education of the early Christian centuries, the development of different types of schools in Mediaeval times, the rise of the University and of the humanistic schools of the Renaissance.

2. HISTORY OF MODERN EDUCATION — ASSISTANT PROFESSOR SWIFT
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have taken course 1 in education.

A somewhat intensive study of the periods in the history of modern education, with special reference to the development of the various national systems of public instruction. Different types of educational theory are considered in connection with a study of the men who first advanced them, and of the schools in which they were first put into effect. This course is a direct preparation for an understanding of the educational systems, theories, and practices of the present.

ENTOMOLOGY

FREDERICK L. WASHBURN, M.A., Professor of Entomology and Chief of Division
A. G. RUGGLES, M.A., Instructor in Entomology
E. W. STAFFORD, B.S.A., Assistant in Entomology

1. GENERAL ENTOMOLOGY — PROFESSOR WASHBURN
One hour per week — First semester

The structure and classification of insects. Study of injurious insects in different orders affecting the household.

2. ECONOMIC ENTOMOLOGY — PROFESSOR WASHBURN AND MR. RUGGLES
Three credits (three hours per week) — First semester
Open to juniors and seniors.

Lectures upon injurious insects of Minnesota and best methods of combating the same. The use of insecticides and spraying machinery. Beneficial insects.

3. FOREST ENTOMOLOGY — MR. RUGGLES
Five credits (six hours per week) — Both semesters
Open to juniors.

The student is given a thorough practical training in elementary entomology. He is directed in a special study of insects affecting forest and shade trees, and will be encouraged in doing field work, collecting, identifying and becoming familiar with the life history of forest insects. Each student will be assigned a forest insect to investigate in the forest during his summer work in the woods. A detailed report, together with specimens of the insect and its work must be turned in to complete the course.

4. COMPARATIVE ANATOMY AND HISTOLOGY OF INSECTS — MR. RUGGLES
Three credits (six hours per week)
Open to juniors and seniors. Elective.

A detailed study of structure of representatives of different orders of insects.

5. ELEMENTS OF BEE KEEPING — PROFESSOR WASHBURN
One credit (two hours per week) — Second half second semester
Open to juniors and seniors.
One lecture a week and work in apiary during spring term.
Offered to those qualified for the work.

6. SPECIAL PROBLEMS — PROFESSOR WASHBURN
Three credits (three hours per week) — First or second semester
Open to graduate students only. Elective.

7. INSECTS AND DISEASES — PROFESSOR WASHBURN
One credit — Second half second semester
Open to juniors and seniors.

Lectures upon insects and insect-like animals which are in any way carriers of disease, or which affect the general health of man or other animals. Such pests as the common house fly (and its relation to typhoid and other diseases), the malarial and yellow fever mosquitos, fever bearing ticks, bot flies, fleas, lice, poultry pests, mange and scab-producing animals will be discussed and studied.

8. GAME PROTECTION AND FISH CULTURE — PROFESSOR WASHBURN
One credit (one hour per week) — Second semester
Open to juniors and seniors.

Relation of game and other birds, and of various four footed animals, to forest protection. Habits, range, usefulness or the contrary. The manner of protecting the important large and small game, fish and birds.

FORESTRY

SAMUEL B. GREEN, B.S., Professor of Forestry and Chief of Division
E. G. CHEYNEY, B.A., Assistant Professor of Forestry
J. P. WENTLING, Assistant Professor of Forestry
DILLON P. TIERNEY, Instructor in Forestry
DANIEL E. WILLARD, Special Lecturer on Forest Soils
J. E. RHODES, Special Lecturer on Forest Economics
C. C. ANDREWS, Special Lecturer on Forest Fire Protection

1. GENERAL FORESTRY — ASSISTANT PROFESSOR CHEYNEY
Three credits — First semester

A brief history of the development of forestry in Europe and America, with the idea of explaining the possibilities of forestry work and the problems which must be solved in this country. The location and brief description of the forests of the world, and more detailed sectional descriptions of the forests of the United States. Lectures and collateral reading.

2. DENDROLOGY — ASSISTANT PROFESSOR WENTLING
Three credits — First semester and first half second semester
Open to sophomores.

A general and comprehensive study of the forest trees of the United States. Their classification, characteristics, range, etc., with special attention to prominent and constant characters as a means of ready identification. Special attention to the important timber trees of the United States. Lectures, assigned reading, special papers, field work.

3. SYLVICULTURE
Six credits — Both semesters
Open to juniors.

a. SYLVICS — ASSISTANT PROFESSOR WENTLING
Three hours per week — First half first semester

Study of the fundamental principles forming the basis of sylviculture, the life history of trees, the influence of environment on tree life in the forest. The origin and determination of forest types, their modification and treatment. Methods of sylvical research. Special attention to the sylvical characteristics of the important commercial species in the United States. Lectures and assigned work.

b. SYLVICULTURE — ASSISTANT PROFESSOR WENTLING
Three hours per week — Second half first semester
First half second semester

Theoretical discussion of the different sylvicultural systems of crop production and reproduction. The practice of sylviculture in the United States and abroad. Consideration of the methods of treatment of woodlands preliminary to the actual field practice of these methods in the forest. Lectures and reference work.

c. SEEDING AND PLANTING — ASSISTANT PROFESSOR WENTLING
In Itasca Park

Production, collecting, testing, vitality, storage and sowing of tree seeds. Location and preparation of nurseries and seed beds. Various methods of nursery practice and seeding. Planting. Examinations, reports and planting plan. Each student must make a complete report and plan for a specified area. The course aims to give the student sufficient practice to enable him to carry on any work in forest planting. Field work with lectures.

d. FOREST SOILS — PROFESSOR WILLARD
In Itasca Park.

This course is given in connection with seeding and planting and is required of each student. It consists chiefly of field studies in forest soils, as to origin, formation, and physical characteristics, with special emphasis on physical analysis. Soil surveys and the making of soil maps. Each student is required to make a complete soil survey of a portion of forest area and to complete a map of same.

4. FOREST PROTECTION — MR. TIERNEY AND GENERAL ANDREWS
Three credits (three hours per week) — First semester
Open to juniors.

Consideration of practical measures for the protection of forests from fires, trespass, grazing, etc. State and Federal forest fire and trespass laws. Protection from forest insects and forest tree diseases will be considered in the particular courses for those subjects. Lectures, assigned reading and original papers.

5. FOREST MENSURATION — ASSISTANT PROFESSOR CHEYNEY
Three credits (180 hours) — In Itasca Park.
Open to juniors.

The measurement of lumber and of logs by different units; the contents of individual felled trees. The height of a standing tree; the volume of individual standing trees and of whole forests. The rate of growth of individual trees and of whole stands. The formation of log rules, stand tables, volume tables, height tables, and yield tables. A study of cruising methods. Text book, lectures and field work.

6. PACKING — PROFESSOR STEWART
One credit (four hours per week) — In Itasca Park.
Open to juniors.

Demonstration and practice under direction in the packing of wagons, boats canoes, pack animals, and pack sacks. Field lectures and practice.

7. LUMBERING — MR. TIERNEY
Three credits (three hours per week) — First semester
Open to seniors.

History of logging in the United States. Different methods used in different parts of the country; cruising, location of camps, building of roads, felling trees, skidding and transportation of logs from woods to the mill. In connection with this course, the student is obliged to hand in a lumbering report based on data collected by him at some lumber camp. This requires an excursion of about two weeks. Lectures and collateral reading.

8. FOREST MANAGEMENT — MR. TIERNEY
Three credits (three hours per week) — First semester
Open to seniors.

Policy of forest owners: principles governing all forest management; forest valuation; the calculation of soil rent, forest rent and the value of growing stock; the values of even and uneven-aged stands. The different methods of management and the principles underlying them. The outlines of a working plan. Lectures and collateral reading.

9. FOREST BY-PRODUCTS — PROFESSOR GREEN AND ASSISTANTS
Three credits (three hours per week) — First semester
Open to seniors.

In this course a special study is made of the products of the forest other than for timber and fuel. The products studied include cellulose for the manufacture of paper, sugar, tanning materials, turpentine, tar, oils, resin, waxes, gum, creosote, wood alcohol, acetic acid, acetone, essential oils, charcoal, camphor and medicinal products. The subjects of paints and the methods for the preservation of wood are also taken up. At the beginning of the course a short time is devoted to a review

10. FOREST ECONOMICS AND FOREST LAW (Economics Course 1a)
PROFESSOR GREEN AND MR. RHODES
Three credits (three hours per week) — First semester
Open to juniors.

The development of forestry in the United States and foreign countries; the forest conditions here and abroad and their effect upon the lumber industry; forest policies of different governments. Lectures, collateral reading and reports.

11. BUSINESS LAW — PROFESSOR GREEN
One credit (four hours per week) — In Itasca Park
Open to seniors.

The fundamental feature underlying contracts; laws governing negotiable papers and their uses; courts and their jurisdiction. The course will deal especially with the application of the subjects to forest conditions.

12. LUMBER MANUFACTURING — ASSISTANT PROFESSOR CHEYNEY
Three credits (six hours per week) — Second semester
Open to seniors.

SAW MILLS

Capital invested, machinery used, methods, cost of operation, and output of portable and stationary mills. Studies will be made of the up-to-date mills of Minneapolis.

LUMBER GRADING

The part which it plays in the lumber industry; methods and organization leading to uniformity. Study of the rules adopted by the Northern Pine Manufacturers' Association. Several excursions are made to the mills of Minneapolis to study grades and grading in the yards. Economic uses of wood by the various wood using industries.

THE LUMBER MARKET

Conditions of the market at present and methods which would tend to its betterment and stability. The demands of the market and how they are supplied.

13. FOREIGN FORESTRY — PROFESSOR GREEN
One credit (four hours per week) — In Itasca Park
Open to seniors.

The development and present status of forestry in foreign civilized countries. Lectures and collateral reading.

14. FOREST WORKING PLANS — ASSISTANT PROFESSOR CHEYNEY
Three credits (180 hours) — Second semester

Open to seniors.

This subject will be given in the woods. A course of lectures paralleling the field work will deal with the principles and methods involved. Each class will be obliged to work out a complete plan including surveys, sylvicultural plans, estimates, field tables, maps and systems of management. Lectures and field work.

15. FOREST SEMINAR — ASSISTANT PROFESSORS CHEYNEY AND WENTLING AND MR. TIERNEY

Three credits (five hours per week) — Second semester

Open to seniors.

This is not, as the term generally implies, a class for the prosecution of original research, but for the purpose of systematically reviewing the whole field of forestry and studying the concrete application of the different branches. Assigned questions and problems; discussions.

18. MATERIALS TESTING LABORATORY (Exp. Eng. 1) — PROFESSOR KAVANAUGH AND MR. SHOOP

Two credits (four hours per week) — First semester

Open to seniors as an elective.

Investigation of the strength and physical qualities of iron, steel, brass, copper, wood, belting, ropes, chains and cement. Supplemented by lectures on the various materials of construction and standard methods of testing.

19. WOOD PRESERVATION — ASSISTANT PROFESSOR CHEYNEY

Three credits (six hours per week) — First semester

Open to seniors Plant Pathology (1) a prerequisite.

The course will consist largely of demonstration work at the plant on the State Fruit Farm. Experiments will be conducted to test the value of different methods of treating, special attention being given to post and pole treatment. The practical work will be supplemented by lectures and collateral reading upon the history of wood preservation, the development of the various methods and a study of the antiseptics used.

20. PHOTOGRAPHY — MR. AYER

One credit (four hours per week) — First semester

Open to juniors.

Practical work in taking pictures, developing and printing will be supplemented by lectures upon the selection of a lens, the mechanism and uses of the camera and kodak, enlarging and reducing, lantern slides and the mixing of solutions. It is advisable that students provide themselves with kodaks.

21. FARM FORESTRY — ASSISTANT PROFESSOR CHEYNEY

One and one-half credits — Last half first semester

Open to juniors in Agriculture.

(2nd half semester)

This course is designed to give a general idea of the objects of forestry practice; formation of plantation including nursery work and planting, trimming, protection and utilization. The establishing of groves and windbreaks. All the details of the handling and use of a woodlot.

Dendrology of common trees; formation of windbreaks and plantations; wood and its uses. Measuring standing and felled timber.

FRENCH

1. BEGINNING FRENCH — ASSISTANT PROFESSORS ANDRIST AND FRELIN, MADAM BERTIN

Six credits (five hours per week) — Both semesters

Open to all, but juniors and seniors receive only half credit; both semesters must be completed before credit is given for the first semester; not credited toward a minor in French. Fraser and Squair's French Grammar and Reader; modern texts.

2. INTERMEDIATE FRENCH ASSISTANT PROFESSOR FRELIN AND MADAM BERTIN
Six credits (three hours per week) Both semesters

Open to sophomores, juniors and seniors who have completed course 1; both semesters must be completed before credit is given for the first semester.

Francois Advanced French Prose Composition; modern texts will be read, including some of the works of Coppee, Merimee, Daudet, Scribe, etc.

GEOLOGY

C. W. HALL, M.A., Professor of Geology
E. M. LEHNERTS, M.A., Assistant Professor of Geology
F. F. GROUT, B.S., Instructor in Geology

1. GENERAL GEOLOGY PROFESSOR HALL
Three credits (three hours per week) First semester

Open to freshmen.

Comprises (1) geodynamics, in which are set forth the phenomena of the atmosphere, water, heat, gravity, and plants and animals as geologic agents; (2) structural geology, wherein stratification, displacement, and veining of rock masses are described; (3) physiographic geology, pointing out prominent earth features and inquiring into the causes pruducing them; (4) an outline of historical geology. Conferences and lectures illustrated by photographs, maps, profiles and lantern slides.

2. PHYSIOGRAPHY ASSISTANT PROFESSOR LEHNERTS
Three credits (three hours per week) First semester

Open to freshmen.

This course is designed for the students in agriculture and forestry; and the work includes: (1) the fundamental facts and principles of mathematical and physical geagraphy and their relation to human industries; (2) minerals, rocks, and building stones; (3) ground and surface waters; (4) physiographic regions of the United States; (5) natural resources,—their utilization and conservation; (6) map studies; (7) local field work; and (8) practical problems. Text book, lectures, and reference reading.

3. INDUSTRIAL GEOGRAPHY ASSISTANT PROFESSOR LEHNERTS
Three credits (three hours per week) Second semester

Open to students who have completed course 1.

The structural features of the North American continent outlined as an introduction. Following this is a study of the types of soil and dominant climatic characters of the several agricultural regions of the continent; a discussion of the geography of industries as they have grown up within the past 100 years and their dependence upon physiographic conditions; a study of local industries affected through excursions and reports. A brief survey of industries in other parts of the world parallels the more detailed study of North America. Throughout the course cause and effect are kept in view.

4. ELEMENTS OF METEOROLOGY ASSISTANT PROFESSOR LEHNERTS
Three credits (three hours per week) Second semester

Open to juniors and seniors who have completed courses 1 or 2.

The general principles of meteorology are treated, embracing the properties and phenomena of the atmosphere, including an explanation of the ordinary observations of pressure and temperature, together with a more extended study of the apparatus and practice of a weather bureau office. This is followed by a study of storms and climatic elements generally. The conditions of climatic changes are studied and the influence of physiographic conditions are discussed. Text-book, lectures, and reference reading.

5. GEOGRAPHY AND GEOLOGY OF MINNESOTA — PROFESSOR HALL
Three credits (three hours per week) — Second semester

Open to juniors and seniors who have completed course 1.

(a) The physical geography of the state in its relation to geological history and industrial development. (b) A study of the principles and facts of pre-Cambrian geology as exemplified within the state and the extension of these into general application. (c) The present problems of the state in agriculture, drainage, water power, mining, quarrying, etc., are considered in some detail.

6. ELEMENTS OF MINERALOGY — PROFESSOR HALL AND MR. GROUT
Three credits (six hours per week) — First semester

Open to sophomores, juniors and seniors; the laboratory fee is three dollars.

(a) The morphology of minerals; the physical and chemical characters of minerals, with demonstrations; a study of the native elements and of economic minerals; the basis of classification. (b) Laboratory work; this consists of practice in the recognition of crystal forms, tests illustrating the range of minerals, and the application of chemical and blowpipe analysis to the identification of species.

GERMAN

1. BEGINNING — PROFESSOR SCHLENKER, ASSISTANT PROFESSORS WILKIN AND JUERGENSEN, MR. BURKHARD, AND MR. WILLIAMS
Six credits (five hours per week) — Both semesters

Open to all, but juniors and seniors receive only half credit; both semesters must be completed before credit is given for the first semester.

Pronunciation, grammar, conversation, and composition; selected reading in easy prose and verse.

2. INTERMEDIATE — PROFESSOR SCHLENKER, MR. BURKHARD AND MR. WILLIAMS
Six credits (three hours per week) — First semester

Open to those who have completed course 1 or its equivalent; both semesters must be completed before credit is given for the first semester. This course may be supplemented by course 5. It should be followed by course 6 or course 7. Students who obtain credit for this course cannot receive credit also for either course 3 or course 4.

First semester, selections from modern narrative and descriptive prose; selected lyrics and ballads. Second semester, a drama of Lessing, Goethe or Schiller.

3. SCIENTIFIC INTERMEDIATE — ASSISTANT PROFESSOR JUERGENSEN
Six credits (three hours per week) — Both semesters

Open to all who have completed course 1; both semesters must be completed before credit is given for the first semester.

First semester: Hodge's German Science Reader (or equivalent). Second semester: Brandt and Day's German Scientific Reading. This course aims to give the student a reading knowledge of German for use in scientific studies.

HORTICULTURE

Samuel B. Green, B.S., Professor of Horticulture and Chief of Division
LeRoy Cady, B.S.Agr., Instructor in Horticulture
A. R. Kohler, B.S.A., Instructor in Horticulture

1. Commercial Fruit Growing — Mr. Kohler
Three credits (three hours per week) — Second semester
Course 8 prerequisite.

Commerical aspects of fruit growing; tillage, fertilization, and irrigation; pollination; relation of insect and fungus diseases and their prevention to fruit growing; storage, harvesting and marketing fruits; and a brief study of the growing of tropical and subtropical fruits. Lectures, text-book and references.

2. Market Gardening — Mr. Kohler
Three credits (six hours per week) — Second semester

Geography of vegetable growing; tillage, fertilization and irrigation; seed sowing; vegetables under glass; pollination; diseases and their prevention; storage, harvesting and marketing of vegetables. Lectures, text-books, references and a study of the commercial establishments in the vicinity.

3. Plant Propagation — Mr. Cady
One and one-half credits (six hours per week) — Last half second semester
Open to sophomores in Forestry.

Study of seeds; vitality and germination tests; propagation of plants by seeds, cuttings, grafting and budding; nursery and forest plantation work. Laboratory work and practicums.

4. Nursery Work — Mr. Cady
One and one-half credits (six hours per week) — First half first semester
Open to juniors.

Seedage, layerage, cuttings, graftage, planting, pruning, thinning, storage of nursery stock; tillage of nursery lands; relation of insect and fungus diseases to nursery stock. Lectures and practice work.

5. Floriculture — Mr. Cady
Three credits (six hours per week) — Second semester
Open to juniors and seniors.

Lectures and laboratory work. Greenhouse management; temperature; soil; watering; benches; propagation; prevention of disease and extermination of insects; rest and growth periods of plants; plants for greenhouse cultivation.

6. Landscape Gardening — Professor Green and Mr. Cady
Three credits (three hours per week) — First semester
Open to juniors and seniors.

A general course in the practice and principles of landscape gardening, special attention being given to the planting of small grounds.

7. Plant Breeding — Professor Green
Three credits (six hours per week) — Second semester
Thremmatology prerequisite.

Lectures and laboratory work. The fact and philosophy of variation; crossing of plants; origin of horticultural varieties of plants.

8. **Systematic Pomology** — Mr. Kohler

Three credits (six hours per week) — First semester

The classification and distribution of temperate, sub-tropical and tropical fruits; technical description and general study of the more important varieties; identification of varieties; judging of fruits; fruit literature. Lectures, laboratory work and references.

9. **Spraying Materials and Compounds** — Mr. Kohler

One and one-half credits (six hours per week) — Last half second semester

Open to seniors.

A study of spraying materials and compounds, their preparation and application. A large number of spraying mixtures will be prepared in the laboratory, types of machinery and apparatus for their application will be studied, and practice given in their application. Students must provide themselves with overall suits for this work.

10 **General Horticulture** — Mr Cady and Assistants

Three credits (six hours per week) — Second semester

Open to sophomores and required of all students in Agriculture.

The course will cover in an elementary way the principles of fruit growing, vegetable gardening and plant propagation. Two class room periods and one afternoon for laboratory work.

11. **Greenhouse Construction** — Professor Green

One and one-half credits (six hours per week) — First half second semester

Open to seniors.

Evolution of the greenhouse; types of houses; materials and methods of construction. Laboratory work in planning and estimating cost of glass houses. Excursions.

LIBRARY METHODS

Miss Anna Smith, Instructor

1. **Library Methods** — Miss Smith

Three credits (six hours per week) — First semester

Open to sophomores in home economics.

Lectures and practice work given in the use of libraries and in the management of school libraries, including selection and purchasing of books, indexing, cataloging and general library administration for such institutions.

2. **Library Methods** — Miss Smith

Three credits (six hours per week) — Second semester

Open to juniors and seniors in agricultural courses. Elective. Similar to course 1, but adapted to those specially interested in agriculture.

PEDAGOGICS

D. D. Mayne, Professor of Agricultural Pedagogics

1. **Principles of Teaching** — Professor Mayne

Three credits (three hours per week) — First semester

Open to sophomores in College and students in Normal Course.

This course includes a consideration of the elementary principles of teaching, a study of general methods, and a special study of methods of teaching industrial subjects. Lectures, assigned readings, discussions and reports.

2. Industrial Education — Professor Mayne
Three credits (three hours per week) — First semester
Open to juniors in College and students in Normal Course.

This course includes a short history of industrial education; the present status of industrial education in Europe and in the United States; the place of manual training and home arts in an educational system; the place of agricultural teaching in the public schools; trade and vocational schools.

3. Plant and Animal Life — Professor Mayne with Assistants from all Divisions
Three credits (three hours per week) — First semester
Open to sophomores in Teachers' Course.

This course is planned as an introduction to agriculture in its various forms. It will include lectures and demonstrations as follows: Agronomy, Soils, Agricultural Botany, Dairying, Breeds, Diseases of Animals, Entomology and Poultry. If possible the lectures will be given by the instructors in the several divisions.

PSYCHOLOGY

Professor Wilde
Assistant Professor Miner

1. Introductory Psychology — Professor Wilde and Assistants
Three credit hours. — First and second semesters

This course is required for all advance work in Psychology and for the teacher's certificate; it also serves an introduction to the courses in philosophy. The purpose of the course is to acquaint the student with the general characteristics and laws of mental life and with the aims and methods of modern psychology. The work involves text-books, lectures and essays.

2. Educational Psychology — Assistant Professor Miner
Three credit hours — Second semester
Open only to sophomores, juniors and seniors who have completed course 1.

The study of mental development in its relation to heredity and training. Lectures and student reports on the facts and theories of childhood and adolescence, with special reference to their bearing on education.

RHETORIC

R. C. Lansing, M.A., Assistant Professor of English

1. General Rhetoric — Assistant Professor Lansing
Three credits each semester (three hours per week) — Both semesters
Open to freshmen.

Theme course: Lectures and recitations on the principles of themes, the construction of sentences, and the use of words. The papers written in the classes and examinations of the various departments of the college will be turned over to the English Department for correction of the English. These will be the subject of personal interviews with the student, and will partly determine his final grade in English.

2. ADVANCED RHETORIC — ASSISTANT PROFESSOR LANSING

Three credits each semester (three hours per week) — Both semesters

Open to students who have passed in course 1 or its equivalent.

The object of the work is to develop clearness, ease, and vigor of expression, and to establish literary standards by analysis and criticism of prose. By presenting oral reports and compositions before the class students are given considerable training in public speaking.

As in course 1, the papers written by the students for other departments will be corrected for their English.

3. ARGUMENTATION — ASSISTANT PROFESSOR LANSING

Three credits each semester (three hours per week) — Both semesters

Open to students who have completed course 1 and to those admitted by the instructor. The course consists of a study of the rules of reasoning, the tests of evidence, and effective presentation. There is frequent practice in writing, briefing, and speaking both from the floor and in formal debate.

4. JUNIOR AND SENIOR ENGLISH — ASSISTANT PROFESSOR LANSING

No credit allowed. Required.

Students who are careless and incorrect in their use of language in papers written in any course will be required to rewrite them under the supervision of the English Department.

SOILS

RALPH HOAGLAND, B. Agr., Professor of Soils and Chief of Division
W. H. FRAZIER, B.S., Instructor in Soils

1. SOILS — PROFESSOR HOAGLAND

Three credits (two lectures, four hours laboratory per week) — First semester

Open to juniors. Chemistry courses 3 and 4 prerequisites.

This course comprises the study of the soil from the geological, physical, chemical and bacteriological points of view. Some of the topics studied are: origin, formation and classification of soils; physical composition, density, pore space, volume weight of soils; soil moisture and methods of conserving it; effects of plowing, harrowing, cultivating, rolling, etc.; washing of soils and methods of prevention; color and temperature of soils; climate; chemical analysis; distribution and supply of plant food; organisms influencing soil conditions; humus; influence of different methods of farming upon humus, recognition by native vegetation, etc.; judging rating and scaling of soils.

Laboratory practice: This work will consist mainly of a geological and physical study of the soil. Some of the experiments are: a microscopic study of the soil forming rocks; microscopic study of the form and size of the soil particle determination of hydroscopic moisture; effect of drainage upon temperature of soil; flocculating action of lime; reaction of soils; apparent and real specific gravity; porosity; conductivity; rate of percolation of air through soils; effects of soil mulches; influence of continuous cultivation and crop rotation upon the properties of soils; extraction of humus, etc.

2. FERTILIZERS — MR. FRAZIER

Three credits (two lectures or recitations; 4 hours laboratory per week)
Second semester

Open to juniors. Course 1, prerequisite.

This course comprises the study of the inherent and cumulative fertility of soils. A further study of the interpretation of chemical analyses and composition of soils, the essential elements of plant food, their occurrence in the soil and availability maintenance of fertility, green manuring, influence of soil bacteria, barnyard manures, commercial fertilizers, their manufacture and composition, draft of farm crops upon the soil, balanced soil conditions.

Laboratory Practice: The object of this work is to acquaint the student in a qualitative way with the elements present in the soil and their relative amounts, also the student is required to study green and farmyard manures and commercial fertilizers from a physical and chemical point of view. Opportunity will be given the student to conduct fertilizer experiments during the summer on his own farm.

3. MECHANICAL ANALYSIS OF SOILS MR. FRAZIER
Three credits (six hours per week) First semestei

Open to juniors and seniors. Soils courses 1 and 2 and Chemistry Course 5, prerequisites.

Laboratory practice in the mechanical analysis of soils by the most important of the eleutriation and sedimentation methods as modified by the ceutrifuge. The student will be required to review and report other methods not used in the laboratory, also a study will be made of results of work already performed and their interpretation

4. CHEMICAL ANALYSIS OF SOILS PROFESSOR HOAGLAND AND MR. FRAZIER
Three credits (six hours laboratory per week) Second semester

Open to juniors and seniors. Soils courses 1 and 2 and 3 and Chemistry course 5, prerequisites.

Laboratory practice in the chemical analysis of soils and a study of the chemical methods employed in soil investigation. The student will be assigned a University Farm plot of which the yields are known for several years, and make a careful study as to the amount of plant food present and the amount removed.

5. ANALYSIS OF FERTILIZERS MR. FRAZIER
Three credits (six laboratory hours per week) First semester

Open to seniors. Soil courses 1 and Chemistry course 5, prerequisites.

Laboratory practice in the analysis of fertilizers according to methods outlined by the Association of Official Agricultural Chemists. The object of this course is to prepare students for analysists in fertilizer control work.

6. RESEARCH WORK IN SOILS PROFESSOR HOAGLAND
Three credits (six laboratory hours per week) Second semester

Open to seniors. Courses 1, 2, 3 and 4 prerequisites.

Special opportunity will be given students in this course to choose some line of investigation, and do original work. A thesis will be required giving all previous data together with results of original work.

VEGETABLE PATHOLOGY AND BOTANY

E. M. FREEMAN, Ph.D., Professor of Vegetable Pathology and Botany and Chief of Division

E. C. STAKMAN, B.A., Instructor in Vegetable Pathology

1. PLANT PATHOLOGY PROFESSOR FREEMAN
Three credits (six hours per week) First semester
Open to juniors.

General outline of the diseases of plants due to fungus organisms; a special study of the life histories and classification of the most important plant diseases, particularly those affecting economic plants of Minnesota. Thesis work and specialization according to the interests of the students; for instance, for forestry students diseases of forest trees; for agronomy students, diseases of cereal crops, etc. Special attention is paid to methods of prevention and cure. Lectures, reference reading, laboratory and thesis work.

2. **Wood Technology** Professor Freeman
Three credits (six hours per week) Second semester
Open to juniors in forestry.

A comprehensive study of the structural features of types of the most important woods of commerce; special reference to the woods of the United States, and particularly to those of this state. Structural development in the life of the tree. Physical and mechanical characters as related to the structural features. A comparative study of a large number of woods with a view to identification and classification. Thesis work on the detailed studies in the histology of the woods.

3. **Agricultural Botany** Professor Freeman
Three credits (six hours per week) First semester
Open to all who have completed course 1, General Botany.

This course will include a study of weeds and weed seeds and methods of detection and eradication. Special study of impurities of Minnesota seeds will be made. It will also include a study of soil botany, particularly the economic phase of leguminous nodules and a life history study of agricultural crops.

4. **Advanced Pathology** Professor Freeman
Six credits (six hours per week) First and second semesters
Open to all who have completed Mycology or course 1 in Plant Pathology. Elective.

Special cultural and laboratory methods in Plant Pathology. Special practical problems in plant diseases. Laboratory reference and lecture work.

5. **Advanced Pathology** Professor Freeman

Graduate work. Open to those who have completed three years' worL in Academic Botany and one year's work in Plant Pathology. Mycology is required as a prerequisite course. Special problems in the investigation and prevention of plant diseases. This course is designed for minor or major sub?ects for candidatesf or advanced degree.

VETERINARY SCIENCE

M. H. Reynolds, B.S., M.D., D.V.M., Professor of Veterinary Medicine and Surgery and Chief of Division
C. C. Lipp, D.V.M., Assistant Professor of Veterinary Medicine and Surgery
C. A. Pyle, B.S., D.V.M., Instructor in Veterinary Science

1. **Veterinary Work** Professor Reynolds and Assistants
Three credits Second semester
Open to juniors.

This course is given by lecture, by practicum and by library work. Its purpose is to fit students for intelligent care of farm stock. The work will cover animal physiology, anatomy, elementary pathology, causes and prevention of disease, lameness, unsoundness, diseases and common medicines; and will be illustrated by stereoptican, charts, skeletons and manikins. Students in forestry complete the work April fifteenth and receive two credits.

2. ANATOMY OF DIGESTION — PROFESSOR REYNOLDS AND DR. PYLE
Two credits (four hours per week) — First half second semester
Open to juniors and seniors. Elective. Given in alternate years, 1911–12.

Comparative anatomy of the digestive organs, dissection, collateral reading and recitations. Chauveau's Comparative Anatomy is used for reference and comparison.

3. PHYSIOLOGY OF NUTRITION — ASSISTANT PROFESSOR LIPP
One and one-half credits (three hours per week) — Last half second semester
Open to juniors and seniors. Elective. Given in alternative years, 1911–12.

This is an advanced study of the veterinary physiology of digestion, taking up the digestive fluids, nervous mechanism of digestion, absorption and digestion of grains and fodders. It also includes a study of body nutrition, body income and expenditures, source of heat supply and heat loss, and metabolism. Veterinary Physiology, by F. Smith, is used as a text and guide for this work, but students are required to do collateral reading.

4. ANATOMY OF LOCOMOTION AND CONFORMATION — DR. PYLE
Two credits (four hours per week) — First half second semester
Open to juniors and seniors. Elective.
Given in alternate years, 1912–13.

This course deals with the anatomy of locomotion. The bones, articulations and muscles involved in locomotion and conformation are studied by text-book, dissection and collateral reading. Shoeing, diagnosis and treatment of common forms of lameness may be included in course 3. Strangeway's Veterinary Anatomy is used as a text-book and Chauveau for reference.

5. COMMON DISEASES — PROFESSOR REYNOLDS
One and one-half credits (three hours per week) — Last half second semester
Open to sophomores, juniors and seniors. Elective.

This course covers causes, prevention, and deals with common and serious diseases of domestic animals.

ZOOLOGY

HENRY F. NACHTRIEB, B.S., Professor of Animal Biology
CHARLES P. SIGERFOOS, Ph.D., Professor of Zoology
JOHN C. BROWN, M.A., Assistant Professor of Animal Biology
HAL. DOWNEY, Ph.D., Assistant Professor of Animal Biology
OSCAR W. OESTLUND, Ph.D., Assistant Professor of Animal Biology
CHARLES E. JOHNSON, M.A., Instructor in Animal Biology

1. GENERAL ZOOLOGY — PROFESSOR SIGERFOOS, ASSISTANT PROFESSORS OESTLUND, BROWN, DOWNEY AND MR. JOHNSON
Six credits (six hours per week) — Both semesters
Open to all; the laboratory fee is three dollars per semester.

This course is a comparative study of the principles of structure, physiology, and development in animals. In the laboratory a brief study of insects and the dissection of the frog are used as a practical introduction to the course. Then follow a study of cell structure and cell division, a systematic study of representatives of the chief phyla or branches of the animal kingdom, and a study of the elements of embryology as illustrated by the development of the star-fish and chick. Lectures, quizzes, and laboratory work. Text-book required: Hertwig's Manual of Zoology.

2. MORPHOLOGY OF INVERTEBRATES PROFESSOR SIGERFOOS AND MR. JOHNSON
Six credits (six hours per week) Both semesters

Open to those who have completed course 1; both semesters must be completed before credit is given for the first semester; the laboratory fee is three dollars per semester.

The object of this course is to familiarize the student with the methods and principles of zoology through an intensive study of two or three groups of animals and to acquaint him with the minor phyla not considered in course 1.

3. ESSENTIALS OF HISTOLOGY AND EMBRYOLOGY PROFESSOR NACHTRIEB AND ASSISTANT PROFESSOR DOWNEY
Six credits (six hours per week) Both semesters

Open to those who have completed course 1; the laboratory fee is three dollars per semester.

In this course are taken up the development and minute structure of the animal as an organism built up of tissue combined into organs, and the student is given practice in general methods, technique, and the use of apparatus. The course prepares directly for most of the advanced courses. Lectures, quizzes and laboratory work.

4. COMPARATIVE ANATOMY OF VERTEBRATES ASSISTANT PROFESSOR BROWN AND MR. JOHNSON
Six credits (six hours per week) Both semesters

Open to those who have completed course 1 or its equivalent; both semesters must be completed before credit is given for the first semester; the laboratory fee is three dollars per semester.

The first semester's work is based upon a study of chordates, cartilaginous and bony fishes and all classes up to mammalia; the second semester to a detailed study of the cat and comparative studies of the rabbit, sheep, and man. Lectures, quizzes and laboratory work. Required text-books: Davidson's Mammalian Anatomy and Burkholder's Anatomy of the Brain.

5. GENERAL PHYSIOLOGY PROFESSOR NACHTRIEB
Six credits (three hours per week) Both semesters

Open to those who have completed course 1; both semesters must be completed before credit is given for the first semester.

In the first semester are considered the physical, structural, and functional features of living substance; the cell, present conditions, and expressions of life; and the theories of the origin of life and death. Demonstrations and simple experiments constitute an essential part of the course in both semesters.

In the second semester the life of the cell is considered in its relation to that of other cells and the course is concluded with special reference to the teaching of physiology in high schools.

Students

POST GRADUATES—10

Allen, Philip T., 2095 Commonwealth Ave., St. Paul.
Baker, George J., 504 Sibley St., St Paul.
Crider, Franklin J., St. Anthony Park.
Deering, Robert L., 427 8th Ave. S. E., Minneapolis.
Gray, Raymond H., Elk River.
Holm, Eva G., 1860 Feronia Ave., St. Paul.
Jehle, R. A., Lindstrom.
Nisbit, Jane, Rochester.
Rosen, Joseph, 710 8th St. S. Minneapolis.
Stakman, E. C., St. Anthony Park.

SPECIAL—5

Casseday, Edith E., 703 Kansas St., Rochester.
Davis, Conrad G., 547 Ashland Ave., St. Paul.
Grant, Mrs. Richard, U. of M., Minneapolis.
Phipps, Mrs. Elizabeth, Monticello.
Stickney, Inez, 901 8th St. S. E., Minneapolis.

SENIORS—25

Arrivee, Agnes, 946 Clark St., St. Paul.
Benson, Arnold O., Glenwood.
Benzin, Basil, 1623 5th St. N. E., Minneapolis.
Berry, James B., 995 Linwood Place, St. Paul.
Billings, Carlos, Audubon.
Bilsborrow, James D., Wolverton.
Brewster, Donald R., 717 Kenwood Parkway, Minneapolis.
Christopherson, Edna H., Sioux Falls, S.D.
Dvorachek, Henry E., Glencoe.
Forsman, John A., 108 S. E. 28th Ave., Duluth.
Gaumnitz, Florence, St. Cloud, R. 1.
Gilbertson, Henry W., Jasper.
Hixon, Agnes, 808 4th St. S. E., Minneapolis.
Jacobson, Norman, Port Washington, Wis.
Johnson, Nelle, Oklahoma City, Okla.
Krauch, Herman, 659 Ravine, St. Paul.
Laate, Gurid, Hardin, Iowa.
La Due, Mabel, 2721 S. Bryant Ave., Minneapolis.
Lewis, Charles L., Jr., 62 S. Dale St., St. Paul.
Older, Frank E., Luverne.
Pike, Torrey Hazel, Monticello.
Rowe, Bess M., 619 16th Ave. S. E., Minneapolis.
Underwood, Clarence, Hutchinson.
Whittle, Sadye, 1005 15th Ave. S. E., Minneapolis.
Wilder, Susan, 3207 Queen Ave. N., Minneapolis.

JUNIORS—42

Arrivee, David A., 946 Clark St., St. Paul.
Aure, Gena M. L., Canby.
Aust, Clara, 320 17th Ave. S. E., Minneapolis.
Baker, Norman M., 710 East 14th St., Davenport, Iowa.
Beard, Frank W., St. Anthony Park.
Blegen, Martha C., 1827 13th Ave. S., Minneapolis.

Bowen, Clarence W., 1009 University Ave. S. E., Minneapolis.
Brownlie, James R., Douglas Court, Davenport, Iowa.
Chase, Ethel E., 3120 4th St. S. E., Minneapolis.
Collin, William H., Northwood, Iowa.
Corniea, Francis A., Plato.
Eisenach, Walter L., Ely.
Gillis, James R., St. Anthony Park.
Glotfelter, Madge L., 105 Bedford St. S. E., Minneapolis.
Hagerman, William F., Morris.
Hartzell, Dorothy, 1 Seymour Ave. S. E., Minneapolis.
Hofmann, Julius V., Janesville.
Howard, Leola M., 1281 Raymond Ave., St. Paul.
Johnson, Fred O., 1459 Gibbs Ave., St. Paul.
Kenety, William H., Fulda.
McNamee, Ruth, Helena, Montana.
Martin, Dean W., 521 4th St. S. E., Minneapolis.
Merrill, Alfred S., 5143 39th Ave. S., Minneapolis.
Miles, Lee O., West Concord.
Raymond, Charlotte A., Little Falls.
Regan, Mabel, 493 Whitall St., St Paul.
Rice, Maude B., Windom.
Sargent, Forrest H., Red Wing.
Schrepel, Minnie A., Le Sueur.
Stewart, Charles D., Sherburne.
Strong, Florence S., 2 E. George St., St. Paul.
Thompson, Arthur H., Concord Apartments, Minneapolis.
Thompson, Mark K., Winsted.
Tolaas, Arne G., 844 Jessamine St., St. Paul.
Underwood, William, Hutchinson.
Uptagrafft, Leroy, St. Anthony Park.
Vancura, Edward W., Lakefield.
Weber, Henry G., 2633 Emerson Ave. S., Minneapolis.
White, Frank W., Excelsior.
Williams, Donald T., 2720 W. 44th St., Minneapolis.
Williams, Ruth, St. Louis Park, R. 1.
Young, John P., 471 Fairview Ave., St. Paul.

SOPHOMORES—63

Anderson, Arthur, Montevideo.
Berg, Joseph H., Willmar.
Beyer, Walter F., 632 Dayton Ave., St. Paul.
Blodgett, Harvey P., 330 West 3rd St., St. Paul.
Brown, Gussie S., 293 Wilder Ave., St. Paul.
Buhler, Ernest O., St. Anthony Park.
Bush, Harvey M., 1119 6th St. S. E., Minneapolis.
Cameron, Gladys M., 889 Laurel Ave., St. Paul.
Campbell, Hugh B., Stillwater.
Carpenter, Paul J., Sleepy Eye, R. 5.
Chase, Alice K., Fergus Falls.
Chase, Arthur G., 2007 Elliott Ave., Minneapolis.
Clymer, William R., 718 St. Anthony Ave., St. Paul.
Conzet, Grover M., Nevis.
Cornish, Ruth, Vernon Center.
Diehl, Winn J., Omaha, Neb.
Drew, Cosette, 5224 41st Ave. S., Minneapolis.
Elwell, Georgia B., 907 7th St. S. E. Minneapolis.
Emerson, Robert C., 1016 Cherokee Ave., W. St. Paul.
Erickson, Richard E., Stillwater.
Field, Edmund T., 630 East 18th St., Minneapolis.
Francis, Llewellyn H., Hutchinson.
Harris, S. Grant, Jr., 1383 Langford Ave., St. Paul.
Hillman, Alice M., 396 Dewey Ave., St. Paul.
Hodgson, Ray W., Luverne
Hopkins, Rachel, Sta. F., R. 1. Minneapolis.
Husby, John, McIntosh.
Jesness, Oscar B., Fosston.
Johnson, F. Roy, Casselton, N. D.
Jordan, Philip S., 812 7th St., S. E., Minneapolis.
Lees, Frank B., 2044 Crystal Lake Ave. N., Minneapolis.
Lewis, Rhoda, 698 Ashland Ave., St. Paul.
Lydiard, Susia C., Long Lake.

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McIntosh, Marguerite F., 201 Cleveland Ave. N., St. Paul.
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Moffat, Frederic R., 60 Chestnut St., Dubuque, Iowa.
Morton, Agnes, Elmwood, Ill.
Mueller, Martha J., 979 Hudson Ave., St. Paul.
Nash, Malcolm A., Tracy.
Noble, William E., Albert Lea.
Norman, Sigvald, Ortonville.
Norsen, Knute, St. Anthony Park.
Nuffer, Harry D., Hills.
Ober, Catherine, 643 Washington St. N. E., Minneapolis.
Olson, Andrew J., Renville.
Oppel, Arthur F., Fulda.
Orr, John Elliott, Michigan City, Ind.
Poe, Richard M., Cannon Falls.
Punderson, James M., 959 Dayton Ave., St. Paul.
Ricks, Nelson D., 423 Beacon St. S. E., Minneapolis.
Savre, Oliver M., Northwood.
Simpson, Charles D., Northfield.
Spellerberg, Frederic E., 383 West 11th St., Dubuque, Iowa.
Stevenson, John A., 2822 Blaisdell Ave., Minneapolis.
Sturges, Paul E., Buffalo.
Swedberg, Jasper, White Bear Lake.
Thompson, Katherine G., 1015 13th Ave., S. E., Minneapolis.
Werner, Henry, Fulda.
Wilson, Robert, Stillwater.
Winter, James D., 418 Groveland Ave., Minneapolis.
Wood, Casper, Waseca.
Youngren, Fridolph N., 3728 2nd Ave. S., Minneapolis.

FRESHMAN—93

Anneberg, Robert D., 964 W. 23rd St., West Des Moines, Iowa.
Armstrong, Joseph J., 889 Hague Ave., St. Paul.
Badger, Grace R., 3311 Portland Ave., Minneapolis.
Bean, Agnes L., 1815 Como Ave. S. E., Minneapolis.
Beare, Thomas W., Brainerd.
Braden, Kenneth J., 1814 East 1st St., Duluth.
Bryan, Robert L., 1677 Hewitt, St. Paul.
Bullock, Benjamin J., Enfield, N. C.
Carpenter, Fred B., Sleepy Eye, R. 5.
Clymer, Arthur E., 718 St. Anthony Ave., St. Paul.
Dahlberg, Robert C., Fergus Falls.
Day, Marcus Frank, 1930 Iglehart St., St. Paul.
DeVeau, Robert W., 1609 University Ave. S. E., Minneapolis.
Dvorachek, Daniel C., Glencoe.
Door, Lester A., Mankato.
Falkenhagen, Jay F., Montevideo.
Fallon, Cecil L., Hutchinson.
Ferraby, Everett J., 2138 Knapp St., St. Paul.
Fissel, Walter P., 1009 University Ave., Minneapolis.
Flint, Howard R., Coleraine.
Frenzel, Frank M., 850 Laurel Ave., St. Paul.
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Griffin, Thomas A., 1510 Lyndale Ave. N., Minneapolis.
Hagen, Percy E., Janesville.
Hall, Edwin Howard, 981 Bayless Ave., St. Anthony Park.
Halverson, Carl A., Revere.
Hancock, Morris W., Mankato.
Harrington, Frank M., Crookston.
Hasselberg, Arthur W., 2101 27th Ave., S., Minneapolis.
Hastings, Morris O., 298 Nelson Ave., St. Paul.
Hauge, Adolph G., Albert Lea.
Henchel, Norman O., Rochester.
Hodgman, Arthur W., 470 Dayton Ave., St. Paul.
Hodson, Herbert G., Mankato.
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Howard, Nina E., 1281 Raymond Ave., St. Paul.
Kelley, Francis John, Belle Plaine.
Kingsbury, Vesta M., Monticello.
Johnson, Jerome B., Faribault.

Knapp, Marjorie, 471 Marshall Ave., St. Paul.
La Plant, Guy A., Elk River.
Liers, Emil E., Dubuque, Iowa.
Lish, Beatrice, Dickinson, N. D.
McGuire, Herman, W., 2523 Dupont Ave., N. Minneapolis.
McKanna, Harry F., Crompton, R. I.
McNee, James, Harmony.
Marsh, Vere P., Argyle.
Marshall, Howard W., Pittsford, Mich.
Middlecoff, Hudson, 205 E. 3rd St., Duluth.
Miles, Clark, 2414 Bayless Ave., St. Paul.
Moir, John 1819 Emerson Ave. S. Minneapolis.
Moore, Fred F., Stewart.
Morck, Hans M., Storden.
Nelson, Carl D., 2605 E. 22nd St. Minneapolis.
Nelson, Julia A., Evansville.
Nicklas, Mabel F., Worthington.
Nordberg, John Jr., 2628 E. 22nd St., Minneapolis.
O'Neil, William E., 704 W. Cen. St., Chippewa Falls, Wis.
Parker, John H., 1271 County Road, St. Paul.
Pearce, William R., 1609 University Ave., Minneapolis.
Pengilly, Alice L., Osseo, R. 1.
Perkins, Alfred G., 1780 Wakefield Ave., St. Paul.
Peterson, Clarence C., 2708 E. 22nd St., Minneapolis.
Peterson, Geraldine F., 93 Orlin Ave. S. E., Minneapolis.
Peterson, Nora H., Litchfield.
Plaisance, Gerald P., Stewart.
Pond, George D., Mankato.
Potter, Olive M., Springfield.
Pratt, Hiram E., St. Anthony Park.
Renshaw, David L., Monona, Iowa.
Rogers, Ernest C., Hammond.
Rogers, Ethel, Windom.
Rose, Raymond, Brainerd.
Rustad, Emil O., Black River Falls, Wis.
Scace, Guy, 315 15th Ave. S. E., Minneapolis.
Shea, Edward B., 106 Wis. St., Milwaukee, Wis.
Smith, Ethel A., 1401 W. 36th St., Minneapolis.
Stamm, Gustav W., 697 Goodrich Ave., St. Paul.
Staples, Myrtle C., West St. Paul, R. 2.
Sterling, Wallace E., 1318 8th St, S. E. Minneapolis.
Story, Donald S., 2615 Dupont Ave. N., Minneapolis.
Streissguth, Theodore C., Arlington.
Tobin, Paul H., 3028 Hennepin Ave., Minneapolis.
Valleau, Guy A., 2231 Scudder St., St. Paul.
Valleau, Wm. Dorney, 2231 Scudder St., St. Paul.
Von Berg, Leonard E., Albert Lea.
Watson, Russell, 102 Hall Ave., St. Paul.
Westell, Inga A., 2420 W. First St., Duluth.
Wiggin, Gilbert H., 225 Harvard St. S. E., Minneapolis.
Wilcox, Roy H., 5408 Nicollet Ave., Minneapolis.
Wilcox, William W., White Bear Lake.
Wyer, Harvey G., Excelsior.
Wyman, Hiram E., Dundas.

TEACHERS' NORMAL COURSE

SECOND YEAR CLASS

Adams, Emma, Owatonna.
Brooks, Elizabeth, Grand Rapids.
Gleason, Clara, 2617 16th Ave. S., Minneapolis.
Hart, Bernice, 1316 5th St. S. E., Minneapolis.
Josephson, Elvira, Minneota.
Lewis, Pauline L., Long Lake.
McClure, Lola, Minneapolis.
Pickett, Tressa A., Chatfield.

FIRST YEAR CLASS

Ackerman, Franc, Blue Earth.
Barrows, Eva C., Herman.
Bauter, Beth B., 228 E. Main St., Owatonna.

Bauter, Winifred, 228 E. Main St., Owatonna
Best, Emir, 1111 3rd Ave. S., Fargo, N. D.
Bluntach, Florence, 314 3rd Ave. S. E., Minneapolis.
Britsch, Lillian E., Lakefield.
Carmichael, Ruth, McKinley.
Carter, Besse E., Rockwell City, Iowa.
Clark, Gale L., Stillwater.
Cleaver, Jessie E., 2633 Garfield Ave., Minneapolis.
Davis, Margaret G., 3432 Harriet Ave. S., Minneapolis.
Doermann Maria C., 1138 Forest St., St. Paul.
Finley, Sadie C., Janesville.
Freeland, Ella, Fulda.
Frye, Phyllis, Elk River.
Gutfleisch, Irmagarde, Janesville.
Hagerman, Charlotte W., Morris.
Hawkinson, Julia D., St. James.
Hitchcock, Alys L., Redwood Falls.
Hoag, Katherine V., 121 E. Isabel St., St. Paul.
Lang, Grace A., 835 22nd Ave., S. Minneapolis.
La Rue, Belle F., 2716 Girard Ave. S., Minneapolis.
Lyon, Helen R., Little Falls.
McArthur, Laura, 2419 W. 22nd St., Minneapolis.
McKenzie, Harriet, 3241 Calhoun Blvd., Minneapolis.
Meehim, Mae D., 811 3rd Ave., Hibbing.
Myers, Nora E., 340 East 22nd St., Minneapolis.
Nash, Charlotte E. Webster, S. D.
Nelson, Esther R., Canby.
Peck, Harriet, St. James.
Pettersen, Aagot, 715 21st Ave. S,, Minneapolis,
Sasse, Jennie E., Blue Earth.
Smith, Elizabeth H., 2432 Aldrich Ave., Minneapolis.
Swenson, Josephine, 2207 Blake Ave., St. Paul.
Taylor, Ruth J., Pipestone.
Tews, Bessie A., Stewartville.
Wheaton, Helen G., Elk River.
Wheeler, Harriet F., Sauk Center.
Wyre, Nina A., St. James.

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